CALENDAR

OF THE

SCHOOL OF MINING

A College of Applied Science

(Affiliated to Queen's University)

KINGSTON, ONT.

FOURTEENTH SESSION

1906-1907.

KINGSTON:
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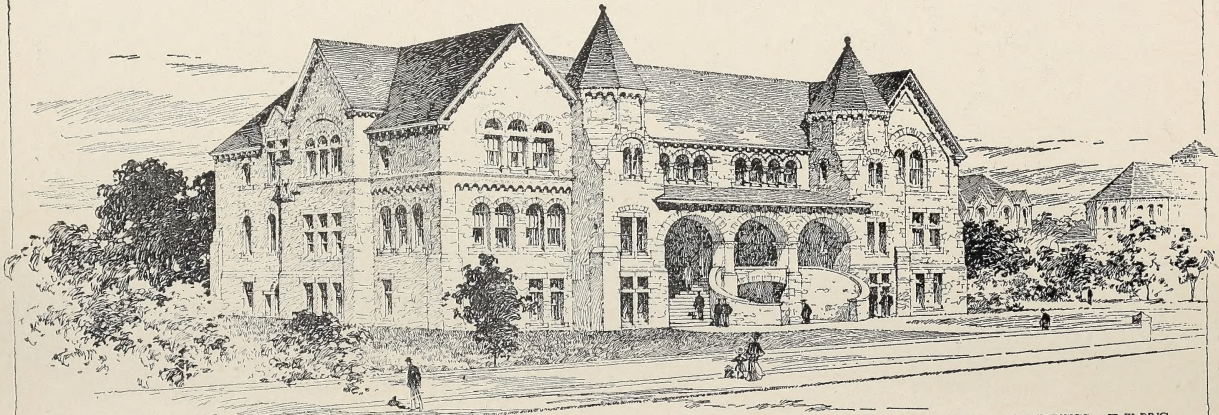
1906.



GEOLOGY MINERALOGY AND PHYSICS BUILDING
SCHOOL OF MINING KINGSTON ONT.
SYMONS & RAE ARCHITECTS TORONTO.

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VISITOR.

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Lieutenant-Governor of Ontario.

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Vice-Chairman .....D. M. McIntyre, B.A.

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W. F. Nickle .....} Appointed by the City Council
Geo. Y. Chown, B.A .....Secretary-Treasurer

CALENDAR.

1906.

Sept. 1—Notice of intention to appear at Matriculation or Supplemental Pass Examinations to be given in writing to the Registrar of Queen's University. Subjects upon which a candidate intends to write must be stated in his notice.
Sept. 1—Engineering Field Work I. begins.
" 11—Supplemental Pass Examinations begin.
" 13—Matriculation Examinations begin.
" 26—Classes open (1st term).
Oct. 16—Holiday for Athletic Games.
Dec. 20—Christmas Holiday begins.

1907.

Jan. 3—Classes re-open (2nd term).
Feb. 15—Holiday.
Mar. 27—Class work closes.
April 1—Examinations begin.
" 23—Meeting of Faculty to consider reports of examiners.
" 24—Convocation for distributing prizes, announcing honours, and laureating graduates.

LABORATORIES.

The hours marked Lab. in the time-table, and others at which students have no lectures, are to be given to Laboratory work.

Laboratory work consists of work in the Draughting room, in the Mechanical shops, the Physical, Chemical, Mineralogical, Petrographical and Assay laboratories.

As early as possible in the session students must arrange with the Professors in charge the hours for laboratory work, so as not to interfere with their class work.

TIME TABLE.

First Year.

	VIII.	IX.	X.	XI.	XII.	I.	II.	III.	IV.
Mon.	Jr. English, A & B.	Math. I.	(b) Surveying. I.	Jr. Chemistry.		Lab.	Lab.	Jr. Chemistry (Practical)	
Tues.	Jr. Eng. A.	Math. I.	Physics I.	Jr. Chemistry.	Jr. English, A & B.	Lab.	Lab.	Lab.	
Wed.	Jr. Eng. B.	Math. I.	Physics I.	Math. I.		Lab.	Lab.	Math. I. (b) Astronomy	
Thur.	Jr. Eng. A.	Math. I.	Physics I.	Math. I.		Lab.	Lab.	Lab.	
Friday.	Jr. Eng. B.	Math. I.	Physics I.	Math. I. (a) Trig.		Lab.	Lab.	Lab. Jr. Chem. B. (Practical)	
Sat.	Lab.	Lab.	Lab.	Lab.					

(a). First Term. (b). Second Term.

TIME TABLE.

Second Year.

	VIII.	IX.	X.	XI.	I.	II.	III.	IV.
Mon.	Physics II.	Min. I.	Math. II.	Gen. Eng. I.	Min. V. (a) Lab.	Min. II. Min. III.	Lab.	Lab.
Tues.	Math. II.	Qualitative Analysis.	Math. II. Botany.	Descr. Geometry.	Lab.	Geology I.	Lab.	Lab.
Wed.	Math. II.	Lab. Surveying II.	Min. V. (a) Botany.	Syst. Min. (b) Optical Min.	Lab.	Surveying II.	Surveying II.	Surveying II.
Thurs.	Sr. Chemistry III.	Gen. Eng. I.	Math. II. Botany.	Sr. Chemistry I.	Lab.	Geology I.	Descr. Geometry.	Descr. Geometry.
Friday.	Math. II.	Surveying II.	Lab.	Sr. Chemistry II.	Physics III. Min. I.	Physics III. Min. I.	Physics II.	
Sat.	Lab.	Lab.	Lab.	Lab.	Lab.	Lab.	Lab.	Lab.

Mineralogical and Geological Excursions will be made during October and November.

(a). First Term. (b). Second Term.

TIME TABLE.

Third Year.

	VIII.	IX.	X.	XI.	I.	II.	III.	IV.
Mon.	Ore Dressing.	Elec. Eng. I. Animal Biolog.	Physics IV. Geology I.	Elect. Eng. II. Mining I.	Min. IV.	General Engineering II.	Industrial Chemistry. (a) I, (b) II.	Lab.
Tues.		Thermo-dynamics I.	Geology III. Hydraulic Eng. I.	Metallurgy I.	Min. IV. Lab.	General Engineering III. Min. IV.	General Engineering III.	Lab.
Wed.	Ore Dressing.	Mech.Eng.I Ry. Eng. I.	Geology II. Struct. Eng. I.	Mining I. Mech. Eng. II.	Min. IV.	Organ. Chem. Railway Eng. I.	Organ Chem. (b) Physical Chemistry I. Railway Eng. I.	Organic Chem.
Thur.	Railway Eng. I. Min. IV.	Thermo-dynamics. I.	Geology III. Hydraulic Eng. I.	Metallurgy I.	Min. IV.	Mechanism.	Indus. Chem. (a) I. (b) II.	Lab.
Friday.	Min. IV.	Mech. Eng. I. Animal Biology.	Geology I.	Surveying IV. Mech. Eng. II.	Lab.	General Engineering II.	Physical Chemistry I.	
Sat.	(a) {Engin {Surve (b) Quant Mineralogi	eering Field ying III. itative Anal cal and Geo	Work II. IV. ysis and Ass logical Excu	aying during the rsions will be m	whole day. ade during	Oct. and Nov.		

(a) First Term. (b) Second Term.

TIME TABLE.

Fourth Year.

	VIII.	IX.	X.	XI.	I.	II.	III.	IV.
Mon.		Hydraulic Eng. III. Mining II.	Metallurgy II. Railway Eng. II.	Geology VI. Mech. Eng. IV.	Des. and Min. Project. Municipal Eng.	Elec. Eng. IV. Des. and Min. Project.	Industrial Chem. I. (a). Elec. Lab. Economics.	Elec. Lab.
Tues.		Metallurgy II. Elect. Eng. V. Hydraulic Eng. IV.	Phys. Chem. II. Hydraulic Eng. I.	Municipal Eng. Elec. Eng. VI. Geology VIII.	Mining II. Hydraulic Eng. III.	Elec. Lab. Hydraulic Eng. II. Met. Lab.	Elec. Lab.	Met. Lab. Elec. Lab.
Wed.		Elec. Eng. IV. Mining II.	Metallurgy II.	Thermodynamics II. Geology VII.	Elec. Eng. VI. Des. and Min. Project. Railway Eng. III.	Elec. Eng. VI. Des. and Min. Project. Elec. Eng. V.	Elec. Eng. VI. Des. and Min. Project. Economics.	Elec. Eng. VI. Min. Law (b).
Thur.		Metallurgy III. Railway Eng. III.	Hydraulic Eng. I.	Mech. Eng. IV. Geology VII.	Struct. Eng. III. Met. Lab.	Met. Lab. Elec. Eng. VI. Mining III.	Indus. Chem. I. (a). Mining Law (b). Elec. Eng. VI. Met. Lab.	Elec. Eng. VI. Min. Law (b).
Friday.	Milling.	Milling. Engineering	Milling. Field Work	Geology VI. Milling. III.	Milling. Explosives (b)	Milling. Elec. Eng. V. Str. Eng. II.	Milling. Elec. Eng. V. Economics.	Milling. Elec. Eng. V.
Sat.	Milling.	Milling.	Milling.	Milling.	Milling.			

(a) First Term. (b) Second Term.

JUNIOR MATRICULATION EXAMINATIONS.

SEPTEMBER, 1906.

		9 a.m.	2 p.m.
Thursday,	13th Sept.	—English Composition.	English Literature.
Friday,	14th "	—History.	Geometry.
Monday,	17th "	—Physics.	
Tuesday,	18th "	—Arithmetic.	Algebra.
Saturday,	22nd "	—Chemistry.	English Grammar.

Time table for supplementary examinations in September will be issued first week in September.

FACULTY.

NATHAN F. DUPUIS, M.A., F.B.S., F.R.S.C.—Professor of Mathematics and Mechanism, and Dean of Faculty.

WILLIAM L. GOODWIN, B.Sc. (LOND.) D.Sc., (EDIN.) F.R.S.C.—Professor of Chemistry and Director of School of Mining.

WILLIAM NICOL, M.A.—Professor of Mineralogy.

W. G. MILLER, B.A.—Professor of Geology and Petrography.

L. W. GILL, B.Sc.—Professor of Electrical and Mechanical Engineering.

STAFFORD KIRKPATRICK, M.Sc.—Professor of Metallurgy.

REGINALD BROCK, M.A.—Acting Professor of Geology and Petrography.

J. C. GWILLIM, B.Sc.—Professor of Mining Engineering.

D. H. MARSHALL, M.A., F.R.S.E.—Emeritus Professor of Physics.

N. R. CARMICHAEL, M.A.—Associate Professor of Physics.

A. K. KIRKPATRICK, C.E.—Professor of Civil Engineering.

ALEXANDER MACPHAIL, M.Sc.—Acting Professor of General Engineering.

JOHN WADDELL, B.A., D.Sc., Ph.D.—Assistant Professor of Chemistry.

H. T. SCHMIDT.—Lecturer on Mechanical Engineering.

A. KENNEDY, M.A.—Lecturer on Applied Mathematics.

W. C. BAKER, M.A.—Lecturer on Physics.

C. W. DICKSON, M.A., Ph.D.—Lecturer on Chemistry.

M. B. BAKER, B.A., B.Sc.—Lecturer on Mineralogy, Geology.

Demonstrators.

D. CAMERON, M.A.
R. D. GUY, M.A.
J. HILL.
W. E. H. WHINTON. } Chemistry.

F. L. SINE.
J. C. POMEROY.
D. J. FRASER. } Physics.

K. C. BERNEY.
H. V. FINNIE. } Drawing.

W. C. WAY, B.Sc.—Electrical Engineering.

J. WADDELL, B.A., D.Sc., Ph.D.—Librarian.

GEO. Y. CHOWN, B.A., Secretary-Treasurer.

Professors of Queen's University whose classes are attended by Students of the School of Mining.

English ..... JAS. CAPPON, M.A., J. MARSHALL, M.A.
Botany ..... JAS. FOWLER, M.A., LL.D., F.R.S.C.
Animal Biology..... A. P. KNIGHT, M.A., M.D.

German . . . . . John Macgillivray, Ph.D. (Leipsic).
French . . . . . P. G. C. Campbell, B.A. (Oxon).
Mathematics . . . . . J. Matheson, M.A.
Economics . . . . . A. Shortt, M.A.

ARTICLE I.—ANNOUNCEMENT.

1. The School of Mining is a branch of the *School of Mining and Agriculture*, incorporated by Act of the Legislature of Ontario. It is affiliated to Queen's University, which confers all degrees.

2. Objects—The objects of the School of Mining are to give a thorough scientific education, both theoretical and practical, to men studying for the profession of the mining, civil, electrical, mechanical, chemical, or sanitary engineer, the assayer, the consulting geologist, and the metallurgist; and to provide for prospectors, mine foremen, and others interested in the discovery and winning of minerals, such instruction as shall make their occupations more interesting and less liable to failure.

3. Situation—The School has been placed near Queen's University so as to take advantage of the instruction therein provided in Mathematics, English, French, German, and the economic and biological sciences. It is in this way possible to equip and carry on a first-class technical school on a much smaller revenue than would otherwise be called for to maintain the high standard of scholarship which the age demands of the engineering profession.

Kingston is well situated as the seat of a mining School. Geology and mineralogy, two of the fundamental subjects of a mining engineer's education, are

studied to best advantage where the minerals can be seen as they lie in nature, and where geological formations can be examined *in situ*. In a few hours a class of students can be taken by carriage to a region so rich in mineral species that about forty different kinds have been secured in an afternoon. There is also a great variety of geological formations within easy access. If to this be added the neighborhood of mines in process of development or in operation, the result is an ideal Mining School city. The German Government has planted its mining schools in such cities, where the education of the mining engineer can be given that practical turn which not only lends a charm to the period of his study but shortens the time between graduation and thorough efficiency and confidence in the practice of his profession. The possibilities of the country to the north of Kingston are, in these respects, very great, and a glance at a geological map shows that the city itself is situated where the mineral-bearing formations, cutting like a broad wedge through the limestone, reach the St. Lawrence and Lake Ontario. The region of mineral-bearing rocks is thus brought almost to the city. On either side, the water front is bordered by a band of limestone, broadening as it extends east and west.

Kingston is also the centre of navigation for Ontario. The Locomotive Works, which are the largest locomotive shops in Ontario, the Dry Dock, the Rideau Canal, and the numerous water powers in the district, offer advantage for the students in Civil, Electrical and Mechanical Engineering.

4. CERTIFICATES of standing may be obtained on application to the Secretary.

5. A CANDIDATE FOR GRADUATION must have completed either the three or the four years' course and have passed all the required examinations.

6. EXPENSES OF A COURSE—The following statement of expenses is made from information obtained from students who have kept an account of their expenditures. Personal expenses are not included in the estimates. The average expense for class fees is taken in this estimate.

FOR EACH SESSION.

Board, lodging and washing	$ 98 00 to	$120 00
Books and Stationery	15 00 "	25 00
Incidentals	9 00 "	14 00
Excursions (geology, mineralogy and mining)	8 00 "	12 00
Class and other fees	80 00 "	80 00
	$210.00	251 00

These estimates are based on board, &c., at from $3.50 to $4 per week, at which rates good board can be had in Kingston.

The fee for graduation is not included in the estimate.

ARTICLE II.—REQUIREMENTS FOR ADMISSION.

I. THE CLASSES in the School of Mining are open to all, but those who are proceeding to a diploma or a degree are required to pass the Matriculation Examination or an equivalent thereto, and must follow one of the courses hereafter mentioned.

II. REGISTRATION—All students are required to register and to pay the registration, athletic and class fees at the beginning of each session.

III. MATRICULATION—The following are the conditions of Matriculation:—

1. Having matriculated in any University in the British Empire or the United States.

2. Having passed the Junior Leaving or Junior Matriculation Examination of the Department of Education of Ontario or equivalent examinations in any other Province, in English Grammar, Composition and Literature, Arithmetic Algebra and Geometry, History of Great Britain and Canada, Physics and Chemistry. The matriculation examinations may also be taken in Queen's University in September. Other examinations will be accepted, so far as they are equivalent.

NOTE—Equivalent Examinations in the different Provinces are:—

Ontario	Jr. Leaving.
Prince Edward Island	Second Class.
Nova Scotia	Grade XI.
New Brunswick	Second Class.
Quebec	Academy Grade. / University School AA.
Manitoba	Second Class.
Saskatchewan / Alberta	Grade VII.
British Columbia	Intermediate.

3. Candidates who offer for matriculation any conditions except (1) or (2) will forward to the Secretary, for the consideration of the Faculty, their applications accompanied by certificates and information.

Students are strongly urged to take the complete Matriculation Examinations with the Modern Languages and Science option. (See page 25, Calendar of Queen's University).

4. Students who have already taken, in a university arts or science faculty or in a recognized technical or

military school, subjects included in a degree course in the School of Mining will, on entering upon a course for the degree of B.Sc., be admitted to the year for which they are qualified.

IV. SPECIAL STUDENTS—Students not proceeding to a degree may take any classes for which they are prepared. The work in Chemistry, Mineralogy, Geology, Drawing, Surveying, etc., is so arranged that those who wish to study these subjects, either for their scientific interest or as leading to professions other than engineering, may profitably pursue their studies here.

ARTICLE III.—SUBJECTS OF MATRICULATION REQUIRED BY THE SCHOOL OF MINING.

ENGLISH.

Grammar and Rhetoric: The main facts in the development of the language. Etymology and syntax, including the logical structure of the sentence and the inflection, classification and elementary analysis of words. The rhetorical structure of the sentence and paragraph.

One examination paper.

Composition.—An essay on one of several themes set by the examiners. In order to pass in this subject, legible writing, correct spelling and punctuation, and proper construction of sentences are indispensable. The Candidates should also give attention to the structure of the whole essay, the effective ordering of the thought, and the accurate employment of good English vocabulary. About two pages of foolscap is suggested as the proper length for the essay; but quality, not quantity, will be mainly regarded.

One examination paper.

Literature.—Such questions shall only be set as may serve to test the Candidate's familiarity with, and intelligent and appreciative comprehenion of, the prescribed texts. The candidates will be expected to have memorized some of the finest passages. In addition to questions on the prescribed selections, others shall be set on a "sight" passage to test the candidate's ability to interpret literature for himself.

One examination paper.

1907: TENNYSON, Ode to Memory, The Dying Swan, The Lotus Eaters, Ulysses, "You ask me, why." "Of old sat Freedom," "Love thou thy land," "Tears, idle tears," and the six interlude songs from The Princess, The Brook, Ode on the Duke of Wellington, Charge of the Light Brigade, Enoch Arden.

SHAKESPEARE: Julius Cæsar.

1908: LONGFELLOW, Evangeline, The Day is Done, The Old Clock on the Stairs, The Fire of Driftwood, Resignation, The Warden of the Cinque Ports, The Bridge, A Gleam of Sunshine.

WORDSWORTH, "Three years she grew in sun and shade." "She was a Phantom of delight," "There is a Flower, the lesser Celandine," To a Skylark ("Ethereal minstrel! pilgrim of the sky!") The Green Linnet, To the Cuckoo, "With little here to do or see."

SHAKESPEARE, Macbeth, Richard II.

MATHEMATICS.

Arithemetic: Elementary Rules, Fractions (Vulgar and Decimal) Interest, Discount, and easy problems in Stocks.

Special attention will be attached to accuracy and neatness.

One examination paper.

Algebra.—Elementary Rules, highest common measure, lowest common multiple, fractions, square root, simple equations of one, two and three unkown quantities, indices, surds, quadratics of one and two unknown quantities.

One examination paper.

Geometry.—

One examination paper.

The examination in Geometry will be based on a short course in practical Geometry, involving the use of the rule, compass, and protractor, and on a course in formal deductive Geometry, which will be defined in a syllabus to be issued by the University.

HISTORY.

Great Britain and Canada from 1763 to 1885, with the outlines of the proceding periods of British History.

The geography relating to the History prescribed.

One examination paper.

ELEMENTARY EXPERIMENTAL SCIENCE.

Physics: Use of the metre rule ; use of the calipers and vernier for more accurate metric measurements (*e g.*, diameters of wires, thickness of glass, plates, etc.) numerical calculations, in the metric system.

Use of balance.

Specific gravity, by specific gravity bottle and hydrostatic balance, of liquids, and of solids.

Boyle's law ; barometer; diffusion of gases.

Use of Fahrenheit and centigrade themometers ; determination of zero and boiling point; boiling point dependent on pressure.

Expansion of liquids, solid and gases, examples.

Specific heat; latent heat; easy numerical examples.

Transmutation of matter; indestructibility of matter.

Solution, precipitation, Crystalization and evaporation.

One half examination paper.

Chemistry: Properties of hydrogen, chlorine, oxygen, sulphur, nitrogen, carbon and their most important compounds. Nomenclature. Laws of combination of the elements. The atomic theory and molecular theory.

ARTICLE IV.—SCHOLARSHIPS AND PRIZES.

EXHIBITION OF 1851 SCIENCE RESEARCH SCHOLARSHIP.

1. This scholarship, of the annual value of £150 stg., is awarded by Her Majesty's Commissioners for the Exhibition of 1851 to students who have given evidence of capacity for original research, and (except in very special circumstances) are under 30 years of age.

The nominee must be a British subject, must have been a *bona fide* student of Queen's University for three years, must have been a student of this University for a full year immediately before his nomination, must be a student of the University at the time of his nomination, (or he must have been a student at this University for a full year ending within twelve months prior to his

nomination and since ceasing to be such student must have been engaged solely in scientific study) and must pledge himself not to hold any position of emolument whilst holding the scholarship. He is recommended to the commissioners by the Senate of the University. The scholarship may be held for a second year, if the report of the first year's work be satisfactory to the Commissioners. The scholar will, in the absence of special circumstances, be required to proceed to an institution other than that by which he is nominated, and there pursue some investigation likely to promote technical industries or scientific culture. The particular investigation the student proposes to pursue must be stated before a scholarship can be awarded.

The next recommendation will be made by the Senate in April, 1907.

Science Research Scholars recommended by Queen's University:—

Norman R. Carmichael, M.A., 1893-94.
Thomas L. Walker, M.A., 1895-6.
Frederick J. Pope, M.A., 1897-8.
Wm. C. Baker, M.A., 1900-1.
C. W. Dickson, M.A., 1901-2-3.
C. W. Knight, B.Sc., 1904-5.
F. H. MacDougall, M.A., B.Sc., 1905.

2. The Bruce Carruthers Scholarships.—The following are the conditions upon which these scholarships (two, of the value of $100 each), are awarded and held:—

1. The candidates must have sufficent practical knowledge to give efficient help in the mining laboratory and in assaying. It is particularly required that they be acquainted with amalgamating.

2. The candidates must have entered upon, or be prepared to enter upon, or have finished, one of the courses of study as at page

28, and preference will be given to the students who stand highest in the third year examinations.

3. It is understood that these duties are to be so arranged as to interfere as little as possible with the studies of the scholars.

4. The scholarships may be held for more than one session.

5. Applications will be received up to April 1st.

3. The Chancellor's Practical Science Scholarship.—Value $70. Given by Sir Sandford Fleming, C.E., K.C.M.G., LL.D., Chancellor of the University. Awarded to the Practical Science student passing the best examination at the end of the first year.

4. Quebec Mining Association Prizes.—Two prizes of $35 and $15 offered by the General Mining Association of the Province of Quebec will be open for competition to students from McGill University, Toronto University and Queen's University, and will be awarded to the two students presenting the best Summer Thesis on some subject connected with mining. Preference will be given to those theses which show decided originality.

The Engineering Society of Queen's University offers two prizes of $15.00 and $10.00 for the two best papers on scientific subjects, by members of the society. These papers must be read before the society, and five papers, at least, must be presented before the prizes will be awarded. These prizes are open for competition to all students of Engineering.

ARTICLE V.—REGULATIONS.

1. EXAMINATIONS.—All examinations for degrees are held under the direction of Queen's University, requirements for pass standing being 40%, and candidates must make application on forms supplied by the Registrar. Sessional Examinations are held in all the subjects prescribed in the various courses. In determining a student's standing at a sessional examination the professors in the different departments are empowered to take into account a student's entire class record. Examination fees must be paid to the Registrar of the University not later than March 23rd for the April examinations, and September 1st for the supplemental examinations.

2. EXAMINATIONS.—Matriculated students must take the April examinations in all subjects in which they are registered and in which these examinations are held. Failure in more than four classes including practical classes in which no written examinations are held, involves the loss of the session. A student failing in not more than four classes is given supplemental examinations the following September. A student is not allowed to enter a year if there are more than two classes of the preceding year which he has not passed. A student shall not enter the third year until he has passed all the examinations of the first year; nor the fourth year until he has passed all the examinations of the second year. In this connection each of the three sections of Mathematics I counts as one class, each of the two sections of Mathematics II as one class, and each of the two sections of Physics I as one class, and all other classes count as one each.

3. ATTENDANCE—Students are required to attend 80% of class lectures before permission will be given to write on examinations and 80% of Laboratory hours before laboratory work will be certified. Exemption from this rule can be obtained only on application to the Faculty.

4. PRACTICAL WORK.—Students are required to take the practical courses given in the calendar unless they have followed similar courses in other educational institutions, but instructors may, at their discretion modify the work in the case of students who have had experience in the field, in engineering works, &c. Such students may be set immediately at more advanced work than that required of those who have not had such experience.

5. COURSES.—All students must take the subjects required in their courses in conformity with the calendars of their years of attendance. If a student wishes to change his course he must first obtain the permission of the Faculty.

6. GRADUATION.—Diplomas for the three years' course are given by the School of Mining, and applications for same must be made to the Secretary, in writing, and the fees paid, before March 23rd. A candidate for a degree in one of the four years' courses must make application and pay the fees to the Registrar of the University before March 23rd. If the candidate fails in his examination the fees will be returned.

7. EXTRA-MURAL STUDENTS.—Students who are not able to attend the School may register in the classes of Junior English, Junior and Senior Chemistry, Elementary Mineralogy and Geology, as extra-mural students

of Queen's University (see calendar of Queen's University, page 51). Tutors are appointed to assist them by correspondence.

8. The excursions are compulsory for all students in Geology, Mineralogy and Mining. (See Field Classes in Geology and Prospecting).

9. FEES.—Registration and class fees must be paid annually on or before October 6th, and laboratory fees before students begin work in the laboratories. Examination, degree graduation, *ad eundum statum*, and University registration fees, are payable to the University Registrar. All other fees are payable to the Treasurer of the School of Mining.

Registration for Practical Science Students	$10 00
" for Arts and Medical Students	1 00
Engineering Society	1 00
Athletics	3 00

FEES FOR A COURSE.

These fees cover all class and laboratory fees for the course.

Per Session	$60 00

Students registered session 1905-06 or previously will be required to pay a fee of only $50 per session.

FEES FOR SINGLE CLASSES, &c.

These are not additional to the sessional fees.

Any Course of Lectures	$12 00
Drawing, One Course, per Session	12 00
Surveying, One Course, per Session	12 00
Assaying Laboratory, per Session	5 00
Chemical Laboratory, per Session	15 00
Petrographical Laboratory, per Session	5 00
Mechanical and Engineering Laboratory, per Session	15 00
Physical Laboratory, Pass, per Session	2 00
Physical Laboratory, Honour, per Session	10 00

GRADUATION AND OTHER FEES.

Graduation B.Sc	$20 00
" M.Sc	20 00
" D.Sc	50 00
" Diploma, three years' Course	10 00
Admission *ad eundum statum*	10 00
Annual Examination Fee	8 00

Students who have paid the April examination fee can write on the September examinations on payment of $4.00.

9. DEPOSITS.—For covering expenses of breakages, &c., a student must deposit $5 with the Treasurer. If at any time the amount of breakages, etc., exceeds $3, an additional deposit of $5.00 must be made. All money to the credit of the depositors will be returned at the end of the session on presentation of the deposit receipt properly certified.

ARTICLE VI.—COURSES OF STUDY.

The following courses are offered:

1. Three years' courses for a diploma.

2. Four years' courses for the degree of Bachelor of Science (B.Sc.) in:

(A) Mining Engineering and Metallurgy.
(B) Chemistry and Mineralogy.
(C) Mineralogy and Geology.
(D) Chemical Engineering.
(E) Civil Engineering.
(F) Mechanical Engineering.
(G) Electrical Engineering.
(H) Biology and Public Health.

3. The degree of Master of Science (M.Sc.) is granted to candidates who have graduated as B.Sc. and there-after

a. Have practised their profession for at least two years (one year of which must have been responsible engineering or scientific work)

or b. Have spent at least one session in attendance after graduation as B.Sc.

In either case the candidate must have carried on research work, the results of which must be submitted, on or before March 30th, in the form of a thesis satisfactory to the Faculty. The literary as well as the scientific quality of the thesis is considered.

In addition to this, an examination is required, on subjects kindred to that treated of in the thesis. The candidate must give notice of his intention to proceed to the degree at least six months before he presents himself for examination, and must at the same time submit the subject of his research for approval. The subjects for examination will then be assigned by the Faculty.

4. The degree of Doctor of Science (D.Sc.) is granted to candidates who have graduated as M.Sc. or have otherwise satisfied the Faculty of their ability to proceed, and have thereafter fulfilled the conditions which here follow.

The degree is not granted until after at least three years from the time of graduation as M.Sc. unless one session is devoted to research in an approval university or school of engineering or applied science in which case the degree may be granted at the end of two years from the time of graduation as M.Sc.

The candidate must submit a thesis embodying the results of his original and independent research in some subject of importance to science. The literary as well as the scientific quality of the thesis is taken into account in judging the candidate's fitness to proceed to the examination.

The candidate must make application in writing to the Secretary at least two years before he proposes to present himself for examination, and must at the same time submit the subject of his research for approval. The subjects of the examination, which will be cognate to that of the thesis, will then be assigned by the Faculty, and will include a reading knowledge of either Scientific French or German.

5. B.A. and M.A. courses in Chemistry, Assaying, Mineralogy, Geology, &c. (See Calendar of Queen's University, pages 53 and 66.)

DOMINION LAND SURVEYORS.

The Diploma or Degree in Mining Engineering or in Civil Engineering of the School of Mining, Kingston, is equivalent to the "diploma as Civil engineer" mentioned in clause 111 of the Dominion Lands Act; so that a candidate for D.L.S. having that diploma from the School of Mining is entitled to examination after one year's service with a D.L.S.

ONTARIO LAND SURVEYORS.

The Ontario Land Surveyors' Act 55 V. c. 34, s. 18. (28). The privilege of a shortened term of apprenticeship shall be accorded to any graduate of . . . . . the School of Mining, Kingston, in Civil Engineering or in Mining Engineering, and such person shall not be required to pass the preliminary examination hereinbefore required for admission to apprenticeship with a land surveyor, but shall only be bound to serve under articles with a practicing land surveyor, duly filed as required by section 32 of this Act, during twelve successive months of actual practice, after which, on complying with all the other requirements, he may undergo the examination prescribed by this Act.

A.—MINING ENGINEERING AND METALLURGY.

In the course of Mining Engineering and Metallurgy some branches of study such as drafting, chemistry and surveying continue through each of the years. It is intended to give the student a sound knowledge and practice in these since they are the usual avenues of employment. The first year, in common with the other engineering courses, is intended to provide a firm foundation in Mathematics, Physics and Chemistry, together with Laboratory work. The second year continues to advance in these fundamental subjects and adds Mineralogy and Geology as special studies.

The third year is principally devoted to technical work in Mining and Metallurgy. An option is introduced for those who wish to specialize in Mining or Metallurgy. A practical course in fire and wet assaying is taken in the second term.

The fourth year takes up more advanced work in Mining and Metallurgy, also Hydraulics; and a considerable portion of the time is spent in designing and mill work. The mining or metallurgical options are continued, both leading to the same degree.

The degree of Bachelor of Science (B.Sc.) is awarded on the completion of this course, and the production of certificates for not less than three months' work in mines or metallurgical works.

First Year.

The letters *(a)* and *(b)* denote first and second term respectively. The numbers in brackets are the hours per week.

Mathematics I (8)	47
Junior English (4)	47
Physics I (6)	48
Junior Chemistry (3)	51
Drawing I (5)	103
Surveying I (1) *(b)*	103

Workshop I (5). 101
Junior French (optional) See Arts Calendar .....
Junior German (optional) See Arts Calendar.....

SECOND YEAR.

Mathematics II (6)..... 48
Physics II (4)..... 50
Senior Chemistry (2)..... 52
Qualitative Analysis I and IV (4)..... 52
Mineralogy I (3)..... 61
Mineralogy III (2) (*b*)..... 66
Geology I (2)..... 67
Drawing II (3)..... 103
Descriptive Geometry (3)..... 102
Surveying II (5)..... 104

THIRD YEAR.

Engineering Field Work I Sept. 1st to 27th..... 89
Mineralogy IV (4)..... 66
Geology IV (1)..... 71
Mining I (2)..... 77
Ore Dressing (2)..... 85
Metallurgy I (2)..... 85
Surveying IV (3)..... 108
General Engineering I (2)..... 88
Electrical Engineering I (1)..... 91
Thermodynamics I (1)..... 87
Mechanism (1)..... 101
Workshop II (3)..... 101

Mining Option.

Geology II, and III (5)..... 70
Quantitative Analysis I (5)..... 56
Fire Assaying (4) (*b*)..... 56

Metallurgy Option.

Geology III (2)..... 70
Quantitative Analysis I, II (7)..... 56
Fire Assaying (4) (*b*)..... 56

FOURTH YEAR.

Mechanical Engineering IV (2)..... 97
Metallurgy II (3)..... 85
General Engineering II (2)..... 88
Hydraulic Engineering I (2)..... 94
Mining II (3)..... 77
Mining Law 108
Milling (12)..... 77

Mining Option.

Geology III (2)..... 70
Designing and Mining Project (5)..... 81
Mining III (1)..... 81

Metallurgy Option.

Metallurgical Reading or Thesis (2)	86
Industrial Chemistry (2)	54
Metallurgical Laboratory (5)	86
Metallurgy III (1)	86

B.—CHEMISTRY AND MINERALOGY.

This course is intended to prepare candidates to enter upon the practice of chemical analysis and assaying, to fit them for positions in the laboratories of metallurgical, mining, manufacturing and other works, and also for the offices of public analyst, of the chemical department of the Geological Survey, and for other positions where a knowledge of chemistry, including chemical analysis and assaying, and of mineralogy, is required. As the course covers also an advanced training in mathematics and physics, and two years' study in geology, the education implied by the four years' study is sufficiently broad to form a good introduction to any career where a scientific training is required. The first three years are occupied mainly with a study of the subjects mentioned, but the greater part of the time in the second and third years is devoted to chemistry, covering such theoretical subjects as chemical laws and theories, organic chemistry and physical chemistry, and also the practical side as represented by qualitative analysis, preparation of organic compounds, industrial chemistry and quantitative analysis. In the third year the minute and careful study of mineral species which has been prepared for in the second year, is accompanied by work in the petrographical laboratory. The fourth year is devoted largely to special chemical analysis and assaying and to research work; but the important modern developments of physical chemistry, so fruitful prac-

tically, find a place in the advanced class in this subject. An original research in some chemical or mineralogical subject is carried on in this year. The research may deal with a subject purely chemical, or purely mineralogical, or may combine the two subjects. The results must be reported in the form of a thesis on or before April 1st, and the thesis must be adjudged satisfactory by the faculty, as a condition for granting the degree.

FIRST YEAR.

Same as first year Course A.

SECOND YEAR.

Mathematics II (8)	48
Physics II (4)	50
Senior Chemistry (2)	52
Qualitative Analysis I, II, III and IV (15)	52
Mineralogy I (3)	61
Mineralogy II (2)	65
Geology I (2)	68

THIRD YEAR.

Organic Chemistry (3) *(a)*	54
Mineralogy IV (5)	66
Quantitative Analysis I, II, III (12)	56
Geology II and IV (2)	70-1
Fire Assaying (4) *(b)*	56
Metallurgy I (2)	85
Industrial Chemistry I, II (2)	54
Physical Chemistry I (2)	54

FOURTH YEAR.

Metallurgy II (3)	85
Physical Chemistry II (2)	54
Advanced Chemical Analysis and Assaying (10)	56
Research and Thesis (20)	

C.—MINERALOGY AND GEOLOGY.

This course is designed to meet the requirements of students who desire a theoretical and practical knowledge of the constitution and history of the earth. It furnishes a foundation for the professions of mineralo-

gist, geological surveyor, mining and consulting geologist, and is useful for those who will in any way be connected with the discovery or the development of the natural resources of the country. It forms a good preliminary course for the mining engineer who wishes to understand thoroughly the groundwork of his profession. Since a knowledge of chemistry is essential for proper comprehension of many mineralogical and geological phenomena, considerable stress is laid on this science in the earlier part of the course. The departments of mineralogy and geology are furnished with well equipped laboratories for the physical and chemical examination of minerals, rocks and ores, and also with collections of illustrative material. While field excursions are made during the session, students are advised to spend the summer vacations in practical field work.

First Year.

Same as first year Course A.

Second Year.

Botany and Animal Biology (5)	73-4
Physics II (4)	50
Senior Chemistry (2)	52
Qualitative Analysis, I, II, III, and IV (15)	52
Mineralogy I (3)	61
Mineralogy II (2)	65
Geology I (2)	68

Third Year.

Mineralogy IV (5)	66
Geology II, III and IV (5)	70-1
Geology V (2) *(a)*	71
Quantitative Analysis I, II, III (12)	56
Fire Assaying (4) *(b)*	56
Topographical Surveying (1)	104
Physical Chemistry I (2)	54

Fourth Year.

Geology VI (2)	72
Geology VII (2)	72

Geology VIII (2) 73
Chemical Mineralogical and Petrographical examination of selected rocks and minerals (20) .....
Original Research, Thesis .....

D.—CHEMICAL ENGINEERING.

In the construction and operation of chemical works and also in metallurgical enterprises in which the processes are of the more complicated kind, there are often required the services of a man who combines a thorough knowledge of chemistry with the education of an engineer; but the chemical engineer must have at his command not merely the elements of general engineering, but also a competent knowledge of those materials of construction and the special kinds of plants and processes which are in use in the works mentioned. The course in chemical engineering covers four years of study, the first two of which do not differ materially from those of other engineering courses. Specialization begins in the third year, in which about half of the time is devoted to chemistry and metallurgy, and the remainder to the elements of mechanical and electrical engineering. Specialization is continued in the fourth year, which includes, in addition to advanced work in chemistry and metallurgy, subjects of electro-metallurgy and chemical engineering.

First Year.

Same as first year Course A.

Second Year.

Mineralogy I (3) 61
Mathematics II (6) 48
Physics II (4) 50
Senior Chemistry (2) 52
Qualitative Analysis I and II (5) 52
General Engineering I (2) 88

Drawing II, III (6)	103
Descriptive Geometry (3)	102
Workshop II (4)	101

THIRD YEAR.

Mechanism (1)	101
Qualitative Analysis III, and IV (10) *(a)*	52
Quantitative Analysis I, and II (10) *(b)*	56
Organic Chemistry II (3)	54
Metallurgy I (2)	85
Industrial Chemistry I (2) *(a)*	54
Mechanical Engineering I, II and III (10)	97
Electrical Engineering I (1)	91
Physical Chemistry I (2)	54
General Engineering II, and III (4)	88

FOURTH YEAR.

Physical Chemistry II (2)	54
Industrial Chemistry II (2) *(b)*	54
Mechanical Engineering IV (2)	97
Metallurgy II, III (4)	85
Economics (3). See Arts Calendar	
Chemical Works and Engineering (5)	
Mining Laboratory (5)	81
Quantitative Analysis III (2)	56
Fire Assaying (4) *(b)*	56
Thermodynamics I (2)	87

E.—CIVIL ENGINEERING.

In this course the two main divisions of Civil Engineering, namely Surveying and Draughting on the one hand, and Structural Design and Construction, on the other, receive full consideration. During the earlier years of the course a sound training along engineering lines is given in Mathematics, Physics, Mechanics and other allied subjects, which are essential to the proper education of an engineer. The student is also made familiar with the use of the various instruments, and by many hours of practical work in the field and draughting room, becomes skilled in the ordinary operations of Surveying. During the same period the foundation work for structural design is laid by courses of lectures in materials of construction, as well as by dem-

onstrations and practical work in the testing laboratories. The third year is opened by a full month of Engineering Field Work, whereby the student is brought into contact with the problems of railway location, and hydrographic surveying. During the final years more highly specialized instruction and training are given along the lines of the two main divisions, with particular regard to the economic conditions of modern construction. At frequent intervals excursions are undertaken to the quarries, cement works, brick kilns, bridges, railway structures, canals and graving docks, which are to be found within easy distance of Kingston.

The subjects of instruction, number of hours per week devoted to each subject, and the page on which the syllabus is to be found, are indicated in the following table.

FIRST YEAR.

Same as first year Course A.

SECOND YEAR.

Mathematics II (6)	48
Physics II (4)	50
Senior Chemistry (2)	52
Mineralogy V (1) (*a*)	67
Descriptive Geometry (3)	102
General Engineering I (2)	88
Surveying II, and III (7)	104
Geology I (2)	68
Workshop II (4)	101
Drawing II (3)	103

THIRD YEAR.

Quantitative Analysis IV (2)	56
Engineering Field Work I, Sept. 1st to 27th	89
General Engineering II, and III (4)	88-9
Thermodynamics I, II (2)	87
Mechanism (1)	101
Surveying IV, and V (5)	108
Engineering Field Work II (4)	90
Metallurgy I (2)	85
Hydraulic Engineering I (2)	94
Structural Engineering I (5)	96
Railway Engineering I (3)	93
Electrical Engineering I (1)	94

FOURTH YEAR.

Railway Engineering II, III (6)	93
Mechanical Engineering IV (2)	97
Structural Engineering II, III (7)	96
Municipal Engineering (3)	93
Hydraulic Engineering II, III, IV (5)	95
Engineering Field Work III (6)	90
Testing Laboratory (3)	88
Explosives and Cements (1)	93
Geology IX (1) (*a*)	73

F.—MECHANICAL ENGINEERING.

The aim of this course is to train the student to deal with the general problems of mechanical engineering.

The first two years are devoted to the study of the fundamental subjects of Mathematics, Physics, Chemistry and Mechanics, including experimental work in the various laboratories. Special attention is given to the subject of strength of materials, with practice in testing, during the second and third years. The study of the steam engine, taken in the third year, includes courses in Thermodynamics, Valve Gears, Governors and the subject of balancing of engines. Courses are also given in Mechanism, Machine Design, and the fundamental principles of Electrical Engineering. The advanced course in Machine Design of the fourth year has for its object the application of fundamental principles to the solution of problems in steam engine design. Instruction in drawing extends over the four years, and deals with the proper way to make necessary dimensioned drawings, tracings and the prints for use in practice.

Classes are taken in the workshop during the four years, with the object of giving the student a general idea of modern methods of machine construction rather than to make him a skilled mechanic. Practical instruction is given in the Mechanical Engineering Labora-

tories to drill the student in methods of carrying out experimental work, such as engine tests, boiler tests, etc. This work takes very largely the form of investigation. The fourth year students are kept in touch with the local manufacturing concerns in order to familiarize them with modern power plants.

FIRST YEAR.

Same as first year Course A.

SECOND YEAR.

Mathematics II (6)	48
Physics II (4)	50
Senior Chemistry (2)	52
Qualitative Analysis I, and III (3)	52
Descriptive Geometry (3)	102
General Engineering I (2)	88
Drawing II, III, IV (9)	103
Workshop II (5)	101

THIRD YEAR.

General Engineering II, III (4)	88
Thermodynamics I, II (2)	87
Mechanical Engineering I, II, III (13)	97
Electrical Engineering I (1)	91
Workshop III (4)	101
Metallurgy I (2)	85
Mechanism (1)	101

FOURTH YEAR.

Hydraulic Engineering I (2)	94
Thermodynamics III (6)	87
Mechanical Engineering IV, V, VI (20)	97
Workshop IV (4)	101

G.—ELECTRICAL ENGINEERING.

The instruction in the first two years of the course in Electrical Engineering provides for a thorough training of the student in the fundamental subjects of Mathematics, Physics, Chemistry and Mechanics, including suitable work in the various laboratories. Part of the time is devoted to elementary drawing and shop work.

In the third year the work consists of an introduction to the general principles underlying all electrical work together with elementary laboratory work. Considerable time is devoted to the study of Thermodynamics and advanced mechanical drawing. The fourth year is devoted to the study of the action and design of all kinds of electrical apparatus, the design and operation of central stations, electric lighting, electric railways and power transmission.

An important part of the work consists in the working out of problems such as are frequently met in practical work. In this way the student is trained in the application of theory to the solution of practical problems.

Arrangements are made for occasional visits to electrical works.

The whole course is designed to give the student a thorough understanding of the general principles which constitute the basis of all electrical work, together with a knowledge of how these principles are applied in practice. No effort is made to give that intimate knowledge of practical details which experience alone can supply.

First Year.

Same as first year Course A.

Second Year.

Mathematics II (6)	48
Physics II, III (6)	50
Senior Chemistry (2)	52
Qualitative Analysis I, and III (3)	52
Descriptive Geometry (3)	102
General Engineering I (2)	88
Drawing II, III (6)	103
Workshop II (4)	101

THIRD YEAR.

General Engineering II, III (4)	88
Thermodynamics I, II (2)	87
Mechanical Engineering I, II (4)	97
Electrical Engineering I, II, III (9)	94
Physics IV (6)	50
Workshop III (4)	101
Mechanism (1)	101
Metallurgy I (2)	85

FOURTH YEAR.

Hydraulic Engineering I (2)	94
Thermodynamics III (6)	87
Mechanical Engineering IV (2)	97
Electrical Engineering IV, V, VI (20)	91
Physical Chemistry II (2)	54
Workshop IV (4)	101
Electro-Metallurgy (1) (*b*)	86

H.—SANITARY ENGINEERING.

This course is intended to prepare students for a profession that is growing in importance every day. Within the past twenty years it has become what may be called a new profession. Sanitary Engineering may be defined as that branch of Engineering concerned in the care and promotion of public health. In by-gone years the public health officer was necessarily a doctor of medicine, because he alone was supposed to be able to take care of the health of a community. But with the development of systems of water supply, gas supply, drainage, electric lighting, and street railways, it has become increasingly apparent that a public health officer must possess, in addition to his medical skill, a knowledge of those branches of Engineering which are concerned in planning, constructing and controlling all these public utilities. In other words a modern public health officer must be in part a trained medical man, and in part a trained engineer. He must, on the medical side, be

familiar with bacteriology, and with the manner in which contagious diseases are spread. Much of this knowledge is inseparably connected with the water supply, drainage system, disposal of refuse and sewerage. To organize such works and control them in the interests of the public health of a community is the work of a Sanitary Engineer.

The course besides preparing students for the profession of Sanitary Engineer, will be found suitable for those who wish to combine a broad scientific course with the ordinary medical one. The two degrees of B.Sc., and M.D., may be taken in six years.

FIRST YEAR.

Same as first year course A.

SECOND YEAR.

Mathematics II (6)	48
Physics II (4)	50
Senior Chemistry (2)	52
Qualitative Analysis I, II, and Urinalysis (10)	52
Animal Biology (3)	74
Mineralogy V (1) *(a)*	67
Geology I (2)	68
Botany (2)	73

THIRD YEAR.

Human Anatomy as for first year Medical Students Physiology and Histology.	See Med. Cal.
Bacteriology Junior Materia Medica Preliminary honours in Animal Biology (12) Quantitative Analysis (water, air, food) (5)	See Med. Cal.
Hydraulic Engineering I (2)	94
Botany of Algæ and Moulds	

FOURTH YEAR.

Human Anatomy; as for second year Medical students (10) Final Honours in Animal Biology Senior Materia Medica and Pharmacy Pathology (3) Sanitary Science (2)	(See Medical Calendar.)
Municipal Engineering (3)	93

Students taking this course and intending to study Medicine are advised to register in the Faculty of Medicine not later than the second session. Such students will pay the regular fee in Science, and in addition must arrange with the Medical Faculty regarding fees for Medical classes. After completing the above course the Medical curriculum may be completed in two years' further study.

HONOUR COURSES IN QUEEN'S UNIVERSITY IN CHEMISTRY MINERALOGY AND GEOLOGY.

The degree of M.A. will be conferred on students who take Pass standing in the Pass classes, and first class honours in the Honour classes, in any one of the following courses.

The degree of B.A. will be conferred on candidates who take Pass standing in the Pass classes, and second or third class honours in the Honour classes of any one of the following courses.

Pass Classes.

Junior English. Senior English. Junior Mathematics. Senior Mathematics. Mental or Moral Philosophy. Junior Physics. Senior Physics. Junior Chemistry. Senior Chemistry.	Nine.
Junior Latin. Senior Latin. Junior Greek. Senior Greek. Junior French. Senior French. Junior German. Senior German. Mental or Moral Philosophy.	Any two.

Honour Classes.

Preliminary and Final Honour Chemistry.
Preliminary and Final Honour Geology.
Preliminary and Final Honour Mineralogy. } Any two.

Specialists' Courses.

By agreement with the Education Department, candidates taking either the M.A. or B.A. Degree under any one of the following Honour courses, who have made 66% on the Honour examinations and attended two sessions, will receive the non-professionl qualification of Specialist in Science.

Pass Classes.

Junior Latin.
Junior French, German or Greek.
Junior and Senior English.
Junior and Senior Mathematics (Honour per centage (50) required).
Junior and Senior Physics (Laboratory practice in both).
Junior and Senior Chemistry.
Botany.
Animal Biology.
Mineralogy I.
Geology I.

Honour Classes.

Preliminary Honour Chemistry.
Preliminary Honour Botany.
Preliminary Honour Animal Biology.

Together with any one of the following groups:

(*a*) Final Honour Botany and Final Honour Animal Biology.
(*b*) Experimental Honour Physics and Final Honour Chemistry.
(*c*) Final Honour Chemistry and Preliminary and Final Honour Mineralogy.
(*d*) Preliminary Honour Mineralogy and Preliminary and Final Honour Geology.

Students intending to teach in Ontario are referred to the Calendar of the Ontario Normal College for information regarding professional examinations.

SIX YEARS' COURSES, B.A. AND B.Sc.

Students taking these courses are required to register the first two years in Arts alone and pay the class and registration fees in Arts, to register the second two years in both Arts and Mining, to pay both registration fees and the Mining Class fees and to register the last two years in Mining only, paying registration and class fees. Arts classes are subject to the regulations in the Arts calendar and Mining classes to the regulations in the Mining Calendar.

A.—MINING ENGINEERING.

FIRST YEAR.

Junior Latin,
Junior Greek,
Junior French,
Junior German,
} Any two.

Junior English,
Mathematics I,
Physics I,

SECOND YEAR.

Senior English,
Junior Chemistry,
Mathematics II,
Physics II,

Mental Philosophy,
Senior Latin,
Senior Greek,
Senior French,
Senior German,
} Any one.

THIRD YEAR.

Economics,
Medieval History,
} Any one.

Workshop I,
Drawing I,

Senior Chemistry,
Mineralogy I,
Surveying I,

FOURTH YEAR.

Geology I,
Preliminary Honour Chemistry,
Preliminary Honour Mineralogy,
Descriptive Geometry,
Surveying II,

General Engineering I,
Drawing II,
Workshop II,

FIFTH YEAR.

Same as third year B.Sc. course.

SIXTH YEAR.

Same as fourth year B.Sc. course.

D.—CHEMICAL ENGINEERING.

First Year.

Junior Latin, Junior Greek, Junior French, Junior German, — Any two.

Junior English, Mathematics I, Physics I,

Second Year.

Senior English, Junior Chemistry, Physics II, Mathematics II,

Mental Philosophy, Senior Latin, Senior Greek, Senior French, Senior German, — Any one.

Third Year.

Economics, Medieval History, — Any one.

Workshop I, Drawing I,

Senior Chemistry, Surveying I,

Mineralogy I,

Fourth Year.

Politics, Moral Philosophy, Preliminary Honour Latin, Preliminary Honour French, Preliminary Honour German, Intermediate Honour English, — Any one.

Qualitative Analysis, Workshop II, General Engineering I, Drawing, II, III, Descriptive Geometry,

Fifth Year.

Same as third year B.Sc. course.

Sixth Year.

Same as fourth year B.Sc. course.

E.—CIVIL ENGINEERING.

First Year.

Junior Latin, Junior Greek, Junior French, Junior German, — Any two.

Junior English, Mathematics I, Physics I,

Second Year.

Senior English, Junior Chemistry, Physics II, Mathematics II,

Mental Philosophy, Senior Latin, Senior Greek, Senior French, Senior German, — Any one.

THIRD YEAR.

Economics, Medieval History, } Any one.

Workshop I,
Drawing I,

Senior Chemistry,
Mineralogy I,
Surveying I.

FOURTH YEAR.

Geology I,
Drawing II,

Workshop II,
Descriptive Geometry,

Politics,
Moral Philosophy,
Preliminary Honour Latin,
Preliminary Honour French,
Preliminary Honour German,
Intermediate Honour English,
General Engineering I,
Surveying II, III,
} Any one.

FIFTH YEAR.

Same as third year B.Sc. course.

SIXTH YEAR.

Same as fourth year B.Sc. course.

F.—MECHANICAL ENGINEERING.

FIRST YEAR.

Junior Latin,
Junior Greek,
Junior French,
Junior German,
} Any two.

Junior English,
Mathematics I,
Physics I.

SECOND YEAR.

Mental Philosophy,
Senior Latin,
Senior Greek,
Senior French,
Senior German,
} Any one.

Mathematics II,
Senior English,
Junior Chemistry.

Physics II.

THIRD YEAR.

Economics, Medieval History, } Any one.

Qualitative Analysis I, and III,
Workshop I,
Drawing I,

Senior Chemistry,
Mineralogy I,
Surveying I.

FOURTH YEAR.

	Workshop II,	
Drawing II, III, and IV,		
Descriptive Geometry,	Politics,	
	Moral Philosophy,	
Qualitative Analysis I, and III.	Preliminary Honour Latin,	Any one.
	Preliminary Honour French,	
General Engineering I.	Preliminary Honour German,	
	Intermediate Honour English,	

FIFTH YEAR.

Same as third year B.Sc. course.

SIXTH YEAR.

Same as fourth year B.Sc. course.

G.—ELECTRICAL ENGINEERING.

FIRST YEAR.

Junior Latin,		Junior English,
Junior Greek,	Any two.	Mathematics I,
Junior French,		Physics I.
Junior German,		

SECOND YEAR.

Senior English,	Mental Philosophy,	
Junior Chemistry,	Senior Latin,	
	Senior Greek,	Any one.
Physics II. and III,	Senior French,	
Mathematics II.	Senior German.	

THIRD YEAR.

Economics,	Any	
Medieval History,	One.	Senior Chemistry,
		Mineralogy I,
Workshop I,		Surveying I.
Drawing I.		

FOURTH YEAR.

Drawing II, III,	Politics,	
Descriptive Geometry,	Moral Philosophy,	
Qualitative Analysis I, and III.	Preliminary Honour Latin,	Any One
	Preliminary Honour French,	
Workshop II,	Preliminary Hon'r German,	
General Engineering I,	Intermediate Hon'r English,	

FIFTH YEAR.

Same as third year B.Sc. course.

SIXTH YEAR.

Same as fourth year B.Sc. course.

SUBJECTS OF STUDY.

ENGLISH LANGUAGE AND LITERATURE.

PROFESSOR—James Cappon, M.A.
ASSISTANT-PROFESSOR—John Marshall, M.A.
TUTORS—A. M. Bothwell, D. A. MacGregor, B.A.

JUNIOR CLASS.

1. Practical course in Rhetoric and composition.
2. Analysis of style in connection with the study of passages from Bacon, Addison, Johnson, Washington Irving, Macaulay, Ruskin, Carlyle, Burroughs, The Best English Essays, The World's Greatest Short Stories. (McClurg & Co., Chicago.)
   Bacon's Essays (Of Truth, Of Studies). (Maynard, Merrill & Co., New York).
   Irving's Sketch Book (Visit to Shakespeare's Birthplace, Rip Van Winkle). (Maynard, Merrill & Co.)
   Macaulay's Essay on Boswell's Johnson. (Maynard, Merrill & Co.)
   John Burroughs, Bees (Baldwin's Specimens of Prose Description. Henry Holt & Co., New York).
   Carlyle, The Storming of the Bastille (Baldwin's Specimens).
3. A detailed study (in class) of the following:
   Chaucer, Prologue to Canterbury Tales. (The descriptions of the Knight, Squire, Prioress, Monk, Friar, Student, Merchant, Franklin, Doctor, Shipman, Parson.)
   Shakespeare, Julius Caesar, Merchant of Venice.
   Longfellow, Prelude, Nuremberg, The Belfry of Bruges, The Skeleton in Armour, Amalfi, The Village Blacksmith, The Day is Done, The Secret of the Sea.
   Tennyson, The Palace of Art, The Lady of Shalott, "Love Thou Thy Land," The Lord of Burleigh.

MATHEMATICS.

Professor: N. F. Dupuis, M.A., F. R. S. C.
Assistant: J. Matheson, M.A.
Lecturer: A. Kennedy, M.A.

MATHEMATICS I.

This class will meet for the study of Mathematics eight hours per week, of which one hour per week during the second term will be given to astronomy. The subjects of study are as follow:s (1) Algebra, including the leading parts of the subject such as multipli-

cation, division, expansion into series, fractions, indices and surds, proportion, graphing of functions, quadratic ; together with permutations and combinations, binomial theorem, undetermined coefficients, summation of series, continued fractions, logarithms, exponentials, etc. Three hours per week.

(2) Elementary Geometry including the first three parts of Dupuis' Plane Geometry, together with the first 131 pages of Dupuis' Solid Geometry. Three hours per week. Particular attention will be given to practical applications of geometric principles.

(3) Trigonometry, including the fundamental principles and formulae with numerous exercises and applications. A great portion of the practical work will be done by means of natural functions. Nature and use of logarithms and tables, inverse functions and the first principles of spherical trigonometry. One and a half hours per week.

(4) Elements of descriptive astronomy, illustrated by the lantern and by models. One hour per week, second term.

In all these subjects exercises will be required.

MATHEMATICS II.

This class will meet for the study of mathematics six hours per week, and the subjects taken up will be as follows :

(1) Sperical Trigonometry and Geodesy, with general theories of projection and perspective. Simple application to spherical astronomy.

(2) Co-ordinate Geometry of two and three dimensions with application to the conic sections and some of the more prominent curves.

(3) The Differential and Integral Calculus, with application to curves and curve tracing, graphing, lengths of lines, areas of surfaces, and volumes of solids, mean centre, moments of inertia, etc., approximate areas by equidistant ordinates.

Two hours will be given to (1) and 4 hours to (2) and (3).

PHYSICS.

Professor Emeritus: D. H. Marshall, M.A., F.R.S.E.
Associate Professor: N. R. Carmichael, M.A.
Lecturer: W. C. Baker, M.A.
Tutors: F. L. Sine, J. C. Pomeroy, D. J. Fraser.

PHYSICS I.

The work of this class consists of :—

(1) An elementary course of four lectures per week on General Physics, including the measurement and discussion of physical

JOHN CARRUTHERS HALL AND MINING LABORATORIES.

quantities, the fundamental principles of dynamics, their application to various practical problems, properties of matter, heat, light, sound, electricity, and magnetism.

(2) Exercises and problems.

(3) Experimental work in the laboratory, two hours per week. The hours for this purpose are arranged at the opening of the session. Demonstrators are present to direct the manipulation of apparatus and to give necessary explanations. A record of all experiments performed is to be kept in a suitable note book which must be left with the Demonstrators for inspection during the Christmas vacation, for the week following the closing of the laboratory in March, and at such other times as may be announced.

Text-books: Carmichael's Physical Experiments, and other books to be prescribed at opening of session.

PHYSICS II.

(1) A course of two lectures per week in continuation of that given in Physics I. The principles of dynamics are developed and applied to problems dealing with statics, simple harmonic motion, the motion of a crank and connecting rod, friction, calculation of moments of inertia, rotation, elasticity, energy and its transformations, thermodynamics, and fluid motion.

(2) Exercises and problems.

(3) Experimental work in the laboratory, two hours per week.

Text-books: Watson's Text-Book of Physics.
Carmichael's Physical Experiments.

PHYSICS III.

(1) Experimental study in the laboratory of certain phenomena of electricity and methods of measuring electrical quantities, two hours per week.

(2) Reading of prescribed parts of the text-book.

Text-book: Sylvanus P. Thompson's Elementary Lessons in Electricity and Magnetism.

PHYSICS IV.

(1) Lectures upon the mathematical theory of electricity and magnetism, one hour per week.

(2) Experimental measurement of electrical quantities in the laboratory, four hours per week.

Text-book: J. J. Thomson's Elements of the Mathematical Theory of Electricity and Magnetism.

THE PHYSICAL LABORATORIES AND LIBRARY.

Two of the largest rooms are equipped as general elementary laboratories for the experiments performed by first and second year students. Six other rooms are fitted for special purposes. All have electric circuits connecting them with a switchboard so that currents of any desired nature may be used in experimental work in any of the rooms. Instruments of precision such as ammeters, voltmeters, electrometers, induction coils of various sizes, measuring microscopes, interferometer, spectrometer, galvanometers of various types, condensers, standards of resistance and self-induction, are available for more advanced work.

The library contains text-books, works of reference and journals devoted to Physics and related subjects. These may be freely consulted by the student in the reading room between the hours of 8 a.m. and 5 p.m. Books may in general be taken from the building overnight upon reporting to a member of the staff and making a record in a book provided for that purpose. It is only by special permission however that any book may be kept away longer than one night at a time.

CHEMISTRY.

Professor: W. L. Goodwin, D. Sc., F.R. S. C.
Assistant-Professor: John Waddell, B.A., D.Sc., Ph.D.
Lecturer: C. W. Dickson, M.A., Ph.D.
Demonstrators: R. D. Guy, M.A., D. R. Cameron, M.A., W. E. H. Whinton, J. Hill.

Junior.

1. *Lectures* on the principles of Chemistry as follows:
Monday and Tuesday at 11 a.m.
Chemical Species; Crystals and Crystallisation; Chemical

Change; Laws of Combination; Relation of Heat to Chemical Changes; Notation; Equations, Nomenclature; Volume Relation of Gases in Chemical Change; Volume Formulae; Molecular Weights; The Atomic Theory; Atomic Weights; Properties of Solutions; Descriptive Chemistry of the Commoner Elements and their compounds; The Periodic Law; Electrolysis; Spectrum Analysis; Chemical calculations.

Text-books:—Newell's Descriptive Chemistry. (D. C. Heath & Co., Boston.) Waddell's Arithmetic of Chemistry. (The Macmillan Co., N.Y.)

Beginners are advised to read Walker's Elementary Inorganic Chemistry. (J. Bell & Sons, London).

2. *Laboratory Practice.* An Introduction to Qualitative Analysis, Monday at 2 p.m.

A. A. Noyes' Qualitative Analysis. (The Macmillan Co., New York).

Senior.

Before taking this class students must have passed in Junior Chemistry.

I. *Lectures* on organic chemistry. (Organic Chemistry I). Thursday at 11 a.m.

II. *Lectures* on chemical laws and theories. Friday at 11 a.m.

III. *Lectures* on the chemistry of the metals, their occurence in nature, reduction and uses. Thursday at 8 a.m.

Students may choose (I) or (III) along with (II).
All engineering students take II and III.
Students in Course D take I, II and III.
Students in Course H take I and II.

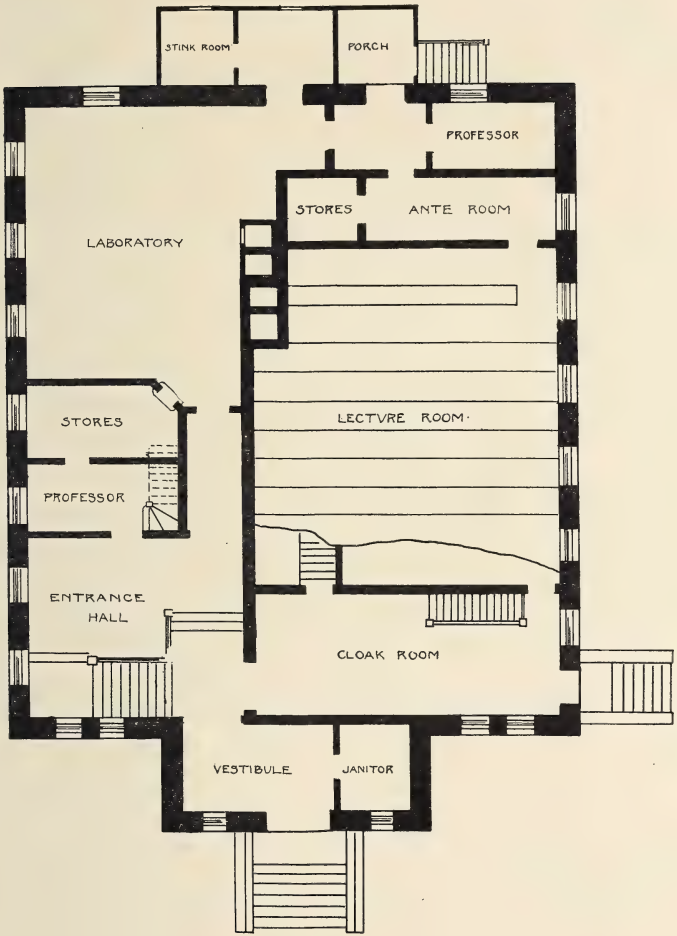
Text Books:—Cohen's Theoretical Organic Chemistry, (Macmillan & Co.)
Richter's Inorganic Chemistry. (Chapters on Metals).
Van Deventer's Physical Chemistry. (J. Wiley & Sons, New York.
Waddell's Arithmetic of Chemistry. Chap. VI. to the end.

Qualitative Analysis.

1. *Introduction.* Students are required to complete the first 25 introductory exercises in Noyes' Qualitative Analysis, and to hand in their note-books for inspection. This must be done before beginning the analysis of unknown substances.

II. *Analysis of Solutions.*
III. *Analysis of Metals and Alloys.*
IV. *Analysis of Minerals.*

CARRVTHERS HALL·
SCHOOL OF MINING KINGSTON ONT·



FIRST FLOOR PLAN

The practical work in qualitative analysis must be completed to the satisfaction of the instructors. Students are expected to master the theory as they proceed with the practice. A competent knowledge of theory will be required.

Text Books:—Arthur A. Noyes' Qualitative Analysis. (The Macmillan Co.)

Treadwell's Analytical Chemistry. Vol. I., Qualitative Analysis. (Translated by Hall; Wiley & Sons).

Fresenius' Qualitative Analysis.

Organic Chemistry II.

The detailed study and preparation of selected carbon compounds—Wednesday, 2-5 p.m.

Industrial Chemistry.

I. Lixiviation, Levigation, Evaporation, Distillation, Sublimation, Filtration, Crystallisation, Calcination, Refrigeration, Sulphur, Sulphuric Acid, Salt, Hydrochloric Acid and Sodium Sulphate, Soda, Chlorine, Nitric Acid, Ammonia, Cyanides, Pigments, Petroleum, Explosives, Cement.

1st term—Monday and Thursday at 3 p.m.

II. Fertilisers, Phosphorus, Arsenic, Sulphates, Potash, Glass, Ceramics, Bromine, Iodine, Water Glass, Peroxides, Oxygen, Carbon Bi-sulphide, Carbon Tetra-Chloride, Manganates and Permanganates, Destructive Distillation of Wood, Illuminating Gas, Coal Tar, Vegetable and Animal Oils, Soap, Candles, Glycerine, Starch, Dextrine and Glucose, Cane Sugar, Fermentation Industries, Textile Industries, (Bleaching and Dyeing), Paper.

2nd Term—Monday and Thursday at 3 p.m.

Text Book:—Thorp's Industrial Chemistry. (The Macmillan Co., New York).

Physical Chemistry.

I. Courses B and D. For the session of 1906-1907 the subjects will be Thermochemistry, Electrochemistry, the Properties of Solutions and the Kinetic Theory of Gases. Friday at 3 p.m.

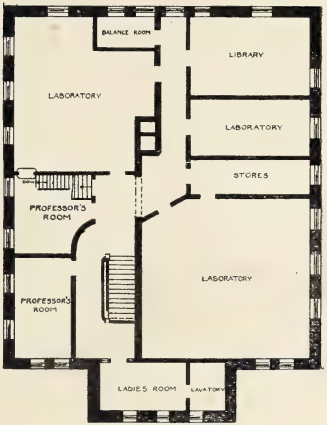
Text-book: Walker's Introduction to Physical Chemistry. (Macmillan & Co.)

II. Courses B, D and G. Lectures on Tuesday at 10 a.m. and on Thursday at 9 a.m.

CARRVTHER'S HALL,
SCHOOL OF MINING KINGSTON ONT.

THIRD FLOOR PLAN

CARRVTHER'S HALL
SCHOOL OF MINING KINGSTON ONT.



SECOND FLOOR PLAN

Quantitative Analysis.

The practical work must be completed to the satisfaction of the instructors. Students are expected to master the theory of the operations as they proceed with them, to write out sufficient explanations in standard note books, and to submit their note books for inspection when each analysis is completed.

I. 1. Barium Chloride—Ba, Cl, H_2O
2. Calcium Carbonate—CaO, $C O_2$
3. A Phosphate—$P_2 O_5$
4. Coal—moisture, volatile matter, fixed carbon, ash
5. Bleaching Powder—available chlorine
6. Iron Ore—Fe, SiO_2, S
7. Lead ore—Pb
8. Copper ore—Cu by electrolytic and cyanide methods
9. Nickel ore—Ni by electrolytic methods

II. 1. Dolomite—SiO_2, $Al_2 O_3$ and $Fe_2 O_3$, CaO, Mg O, $C O_2$
2. Pig iron—Si, P, Mn, C

III. 1. Barite—BaO, SrO, $S O_3$
2. Bronze—Cu, Sn, Zn
3. Alkalimetry
4. Acidimetry
5. Chromite—$Cr_2 O_3$
6. Feldspar—SiO_2, Al_2O_3, CaO, MgO, $K_2 O$, $Na_2 O$,
7. Titaniferous iron ore—TiO_2, Fe, SiO_2, S, P, Mn, CaO, Mg O
8. Arsenopyrite—As
9. An Ammonium Salt—$N H_3$
10. Zinc ore - Zn

IV. 1. Magnesium Sulphate—$S O_3$
2. Calcite—CaO, $C O_2$
3. Cement—CaO, MgO, Fe_2O_3, $Al_2 O_3$, SiO_2, $S O_3$
4. Steel—Fe, Mn, C, Si, S, P.
5. Water—Temporary and permanent hardness, Cl, oxygen-consuming power, total solids.

I. is for course A, mining option
I. and II. for course A, metallurgy option
I., II. and III. for courses B, C and D
IV. for course E only.

Fire Assaying.

Fire assay of Gold and Silver
a. Gold in quartz
b. Gold in an oxidised ore
c. Gold in a sulphide ore
(1) by roasting, (2) by nail assay
d. Silver in pig lead by cupellation

LABORATORY I (John Carruthers Hall.)

LABORATORY II (John Carruthers Hall.)

LABORATORY III (John Carruthers Hall.)

e. Gold and Silver in copper matte
(1) by pot assay, (2) by scorification

Text-books: Bolton's Quantitative Analysis. (J. Wiley & Sons, New York).
Furman's Manual of Assaying (J. Wiley & Sons).
Waddell's Arithmetic of Chemistry. (The Macmillan Co.)
Fresenius' Quantitative Analysis.

THE CHEMICAL LABORATORIES.

The practical work in chemistry is carried on in five laboratories: No. 1 for qualitative analysis, Nos. 2 and 4 for quantitative analysis, No. 3 for experimentation in class, and No. 5 for preparation of chemical substances. Nos. 1 and 2 are fitted up with 62 and 42, respectively, locked work places, so that 104 students can be provided each with a set of apparatus under lock and key. These laboratories are open from 8 a.m. to 5 p.m., and students are allowed to carry on their analytical work when not otherwise engaged. The number of hours a day to be spent in the laboratories depends to some extent on the aptitude of the student for experimentation. No. 3 serves both as a laboratory and as a class room. It is furnished with seats and desks which are at the same time work tables. In No. 5 advanced students make organic and inorganic preparations. Besides these larger laboratories there are smaller rooms devoted to special branches of analytical chemistry and to research.

Each student, before entering any practical class, is required to deposit five dollars with the Secretary. On presenting to the instructor of the class the receipt for this, and the class ticket, the student receives the key of his place and a set of apparatus. The deposit is re-

turned at the end of the session, breakages, etc., having been deducted.

Students are required to make their reports of analysis written neatly with ink on blanks provided for that purpose.

MINERALOGY.

ONTARIO HALL. *Third Floor.*

Professor: WILLIAM NICOL, M.A.
Lecturer: MANLEY B. BAKER, B.A., B. Sc.

The work in this department is intended for students taking the courses in mining engineering and metallurgy, chemistry and mineralogy, mineralogy and geology, chemical engineering, and civil engineering.

It consists of five sections, viz.: Mineralogy I., II., III., IV. and V.

Students in Course A. take sections I. and III. in the second year, and section IV. in the third year.

Students in Courses B. and C. take sections I., II. and III. in the second year, and section IV. in the third year.

Students in Course D. take section I. in the second year.

Students in Courses E. and H. take section V. in the fall term of the second year.

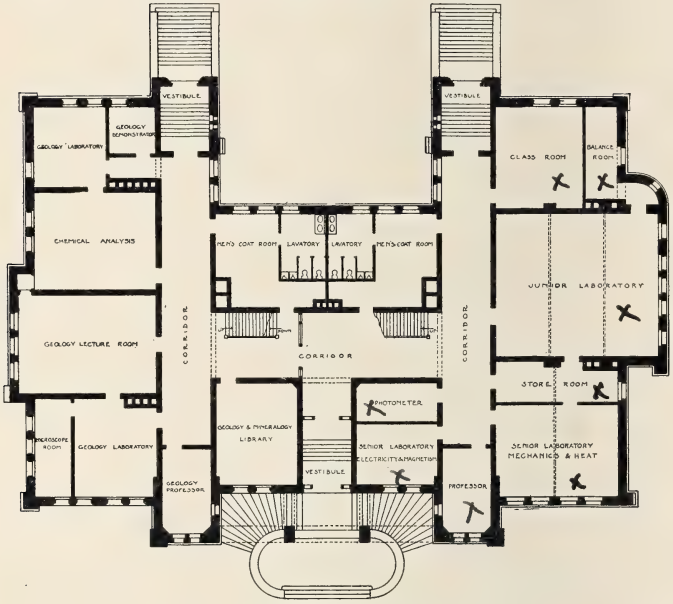
MINERALOGY I.

Elementary Mineralogy.

The work in this class is intended as a preparation for those entering upon the studies of geology, petrography, mining and metallurgy. The class should be taken in the second session, after junior chemistry and junior physics of the first session, as a knowledge of chemistry and physics is necessary for a proper comprehension of the subject. The regular work consists of (1) a course of lectures and demonstrations on crystallography at the beginning of the fall term, (2) illustrated lectures on the physical, optical and other properties of minerals, (3) the description of about sixty prominent Canadian minerals, (4) practical work in the determination of these by means of the blowpipe and field tests.

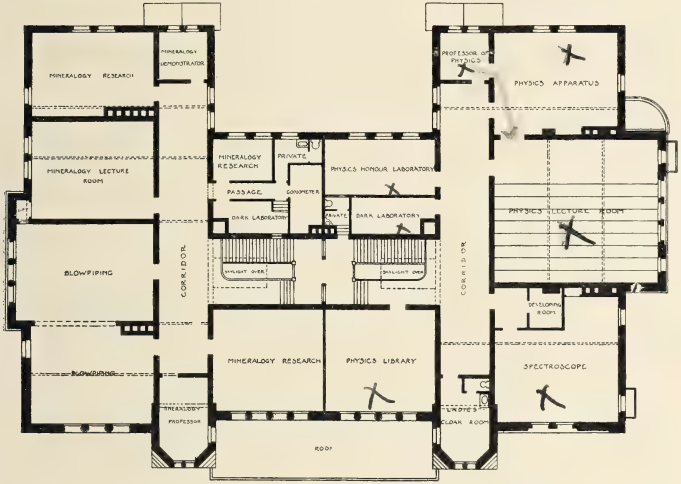
Each student is supplied for the session with a locked cabinet and collection of minerals for which he is held responsible, and for which a deposit must be made. The practical work of the class is conducted in the mineralogical and blowpipe laboratory,

PHYSICS, GEOLOGY AND MINERALOGY BUILDING.



FIRST FLOOR PLAN.

PHYSICS, GEOLOGY AND MINERALOGY BUILDING.



SECOND FLOOR PLAN

PHYSICS, GEOLOGY AND MINERALOGY BUILDING.

GROUND FLOOR PLAN

where cabinets containing specimens of commonly occurring minerals are arranged for use. Students are taught to recognize minerals by simple field tests, such as form, colour, streak, hardness, specific gravity, etc. For this work students must provide themselves with a pocket-lens, knife, streak-plate and magnet.

The regular class meets at 9 a.m. on Mondays. Excursions to mineral localities in the vicinity of Kingston are held on the Saturdays of the fall term.

The class in blowpipe analysis meets in the blowpipe laboratory on Friday afternoons, 1–3 o'clock. Students must supply their own blowpipe apparatus.

Students are urged to make use of the museum in the basement and of the study provided for them in the mineralogical department.

Text-Books:—Williams' Crystallography.
Miller's Minerals and How They Occur.
Brush & Penfield's Manual of Determinative Mineralogy and Blowpipe Analysis, 15th Ed., 1905. (Wiley & Sons).

Books for Reference:—Crosby's Tables for the Determination of Minerals.
Eakle's Tables.
Moses & Parson's Mineralogy, Crystallography and Blowpipe Analysis, 2nd Ed.
Endlich's Manual of Qualitative Blowpipe Analysis.
Landauer's Blowpipe Analysis.
Kolbeck's 6th Ed. of Plattner's Probirkunst mit dem Löthrohre.

Books from the Department Library and from the Professor's private library may be obtained from the Professor.

MINERALOGY II.

Systematic Mineralogy.

The work of this class is intended for those taking courses B. and C., and is preparatory to the work in geology, petrography, and descriptive and determinative mineralogy, which should be taken during the session following.

The regular work consists of a course of lectures, two hours per week, dealing with the physical, optical and other properties of minerals, illustrated by specimens from the lecture cabinet, microscopic slides, thin sections, models, charts and lantern slides. Essays on prescribed subjects are required.

The class meets at 2 p.m. on Mondays, and at 11 a.m. on Wednesdays in the mineralogy lecture room in the mineralogy-geology building.

Text-Books :—Dana's Text-book of Mineralogy, 1905. (Wiley & Sons).
Williams' Crystallography. (Henry Holt & Co.)

Books for Reference :—Miers' Mineralogy.
Tschermaks' *Mineralogie.*
Brauns' *Mineralreich.*

MINERALOGY III.

Optical Mineralogy.

The work of this class is intended for those students only who are taking Course A., mining engineering, and is preparatory to the classes of petrography and determinative mineralogy, which should be taken during the session following. The work consists of the regular classes in systematic mineralogy for the winter term at 2 p.m. on Mondays and 11 a.m. on Wednesdays. The lectures treat of light and the optical properties of minerals. Reflection, diffusion, refraction, dispersion, polarization, absorption, color, etc., are described and illustrated by the use of the lantern and projection apparatus.

Text-Books :—Dana's Text-book of Mineralogy, 1905. (Wiley & Sons.)

MINERALOGY IV.

Descriptive and Determinative Mineralogy.

Before taking this class students in Course A. must have passed in Mineralogy I., II. and III., and students in Courses B. and C. in Mineralogy II. and III. It should be taken along with the classes of petrography, economic geology and metallurgy in the third year.

The work of this class consists in the exhibition and description of the mineral specimens contained in the several museum collections, special attention being given to ores, gangue-minerals, those having a commercial value and those of importance as rock-forming minerals in geology. By field tests and the use of the blowpipe, practice is obtained in the determination of minerals. Cabinets furnished with specimens of minerals from various parts of the world are supplied for students' use. The number of specimens is being constantly increased by collection, donation, exchange and purchase, the aim being to make the collection as complete as possible.

The class meets on Mondays at 1 p.m. for the descriptive part, on Tuesdays 1-2 p.m. for the blowpipe work, and on Wednesdays and Thursdays at 1 p.m. for the field tests. *Attendance compulsory.*

Text-Books :—Dana's Text-book of Mineralogy, 1905.
Brush & Penfield's Manual of Determinative Mineralogy and Blowpipe Analysis, 15th Ed., 1905.

MINERALOGY V.

Preparatory Mineralogy.

The work of this class is intended for students taking the course in civil engineering—Course E.—and for those who attend the class of Geology I. without any previous knowledge of mineralogy—students in Course H.

The work consists of a course of about a dozen practical demonstrations, one hour per week during the fall term, to make students familiar with the more common rock-forming minerals, so that the geology lectures may be more intelligible. The students are taught to recognize minerals by field-tests, such as form, colour, lustre, streak, hardness, specific gravity, etc.

Minerals and text-books are supplied to the students for use each day.

The class meets on Wednesdays, at 10 a.m., in the mineralogy lecture room, Ontario Hall, third floor.

The attention of students is called to the collection of minerals on exhibition in the students' study, and to the several collections in the museum in the basement.

GEOLOGY.

Professor: WILLET G. MILLER, M.A., F.G.S.A.
Acting Professor. R. W. BROCK, M.A., F.G.S.A.
Lecturer: M. B. BAKER, B.A., B.Sc.

The instruction in this department is adapted to the needs of the prospector, the mining engineer, and the professional geologist. Provision is also made for persons who desire a knowledge of the subject as part of a general education. Graduates and others who wish to pursue some special line of investigation, or to have the use of the laboratories and apparatus, in order to work up material collected by themselves, will have every facility placed at their disposal.

Students have access to the Geological and Mineralogical museum, which contains a large number of specimens illustrative of petrography, Paleontology, economic minerals, and general geology of Canada.

Advice concerning field work in geology during the summer vacation will be given by the professor.

Students are advised to procure copies of some of the text-books and to gain some acquaintance with them during the long vacation, preceding the beginning of the session in October.

The petrographical laboratories are supplied with electric power and provided with the most approved lathes and other appa-

ratus needed in cutting, slicing, grinding and polishing specimens, and in the preparation of thin sections of minerals and rocks for microscopical examination.

Laboratory facilities are also provided for micro-chemical tests and for the use of the electric magnet and heavy solutions in sepa rating the constituents of the rocks.

The School owns a number of petrographical microscopes of the latest and most improved designs, and a large collection of thin sections of type rocks, minerals and ores with corresponding hand specimens, which are used by the classes for detailed study, under supervision of the staff.

The chemical laboratory of the Geological Department will be supplied with the apparatus necessary for the chemical investigation of rocks and ores.

Laboratory facilities are also provided for geological experiments.

The reading room is supplied with geological publications and a library.

Second Year.

I.

ELEMENTARY GEOLOGY.

Students taking this class must have passed in junior chemistry. They are also required to take the class in elementary mineralogy.

The object of this course is to give a general knowledge of the subject as an introduction to the work of the third and fourth years.

The following themes will be treated of in the lectures :—

The planetary relations of the earth ; the atmosphere ; waters ; solid crust; probable nature of the earth's interior; rocks, their general megascopic and microscopic characters and classification; volcanic action; earthquakes; upheaval ; subsidence: geological effects produced by heat, air, water and life ; bosses; dykes; veins; stratification; dip; strike; anticline and syncline; faults; foliation; nature and uses of fossils; stratigraphical geology; outline of the geological history of the globe, etc.

The lectures are illustrated by means of maps, diagrams and lantern views.

The laboratory work will consist of the examination of typical specimens of the different groups of fossil plants and animals, and of hand specimens of the more common rocks.

During the months of October and November excursions will be made to places of geological interest in the vicinity of Kingston. Students are expected to take part in all of these excursions. The cost will not exceed five dollars. Each student should provide himself with a suitable hammer, specimen bag and note-book.

FIRE ASSAYING LABORATORY (Carruthers Hall.)

Students are required to provide themselves with a copy of W. B. Scott's "An Introduction to Geology" (The Macmillan Co., price $1.90), which is used as text-book.

Books for Reference:

The Elements of Geology. (William H. Norton).
Kemp's "Handbook on Rocks," (price $1.50.)
LeConte's Compend of Geology.
Dana's Manual of Geology, (last edition).
Chapman's Minerals and Geology of Ontario and Quebec.

Third Year.

II.

GENERAL GEOLOGY AND GEOLOGY OF CANADA.

Before taking this class students must have passed in geology of the second year.

In this course special attention will be given to stratigraphical geology and the geology of Canada. Type fossils of the different formations will be studied.

Text Book :—LeConte's Elements of Geology, 5th Ed.

Books for Reference:

Chapman's Minerals and Geology of Ontario and Quebec.
Dawson's Geology of Canada.
Dana's Manual of Geology.
Wood's Elementary Palaeontology.
Reports of the Geological Survey of Canada.

III.

ELEMENTARY PETROGRAPHY.

Students must have passed in Geology I. and optical or systematic mineralogy.

This course will consist of lectures on the use of the petrographical microscope and accessories in the determination of the rock-forming minerals, and on the determination of some of the more common igneous rocks.

The lectures will be illustrated by means of microscopic projections of thin sections of minerals and rocks, and will be supplemented by laboratory work of 2 hours per week all session.

A considerable variety of igneous rocks occurs in the Kingston district. These will be studied in the field and specimens will be collected by each student for examination in the laboratory.

Boxes for holding slides and material used in the preparation of thin sections may be obtained from the janitor.

Each student must provide himself with a copy of Kemp's Handbook of Rocks (price $1.50), and a copy of Luquer's Minerals in Rock Sections.

Text-Books and Books for Reference:

Rosenbusch—Iddings Microscopical Physiography of Rock-Forming Minerals.
Loewinson-Lessing's Tables for the Determination of the Rock-Forming Minerals.
Hatch's Petrology.
Harker's Petrology for students.

IV.

MINING GEOLOGY.

Before taking this class students must have passed in Geology I.

Lectures on the origin, modes of occurrence and uses of metalliferous minerals, with mention of the chief localities. The characters by which ore bodies are sometimes indicated to the prospector will be described. A sketch will be given of the geology of some of the leading mining districts.

During the fall term excursions will be made to various mines in the vicinity of Kingston.

Each student is to provide himself with a copy of Branner & Newsom's Syllabus of Economic Geology (price $2.75).

Text-Books and Books for Reference:

Philips' Ore Deposits.
Kemp's Ore Deposits.
Nature of Ore Deposits by Dr. R. Beck, trans. by W. H. Weed.
Mineral Statistics, Geological Surveys of Canada and the United States.
Rothwell, the Mineral Industry. Vols. I-XIII.
Origin of Ore Deposits. American Institute of Mining Engineers.
Economic Geology of the United States. Ries.

V.

FIELD AND LABORATORY GEOLOGY.

The laboratory exercises in this course are designed to illustrate by means of specimens, models, photographs, maps and sections, the principal original and secondary structures of rock; the origin and mode of occurrence of rocks in the earth's crust, their cycles of alteration and change; their interpretation and representation in geological surveys.

The field work comprises observations upon the weathering of rocks; shore phenomena; glacial phenomena; igneous and sedementary rocks; faulting; folds; joints; cleavage; schistosity. Practice in

in methods of surveying and geological mapping and construction of sections; measuring the thickness of strata and determining the relation ages of geological structures.

Working hours will be arranged to suit the class.

Fourth Year.

VI.

GENERAL GEOLOGY.

A study will be made of structural and dynamical geology in connection with their bearings on economic problems.

Opportunities will be offered for those wishing to prosecute any special line of investigation.

Students are advised to devote as much time as possible to field work during the preceding long vacation, and to collect material for study in the laboratory during the winter.

Students are expected to supplement their reading by a study of the collections in the museum.

Text Book :—Chamberlain & Salisbury's Geology.
Geikie's Field Geology.
Geikie's Founders of Geology.
Zittel's History of Geology.

Books for Reference :—Geikie's Text-book of Geology. 4th Ed.
Nicholson's Palaeontology.
Zittel's Palaeontology (Eastman).
Williams' Geological Biology.
Dana's Manual of Geology.

VII.

ADVANCED PETROGRAPHY.

A course of lectures will be given on the microscopic characters and classification of the igneous rocks and on the characters, origin and classification of the pre-Cambrian formation.

Special attention will be paid to the metamorphic series of the Kingston District, as exceptional opportunities are here offered for the study of the field relations of these rocks, and for attacking those problems as to their origin which are now attracting the attention of geologists.

Text-Books and Books for Reference:

Rosenbusch—*Die Massige Gesteine., Elemente der Gesteinslehre.*
Zirkel—*Lehrbuch der Petrographie.* Vols. I, II. and III.
Levy and Lacroix—*Les Mineraux des Roches.*
Rosenbusch-Iddings—Microscopical Physiography of Rock-Forming Minerals.

Iddings—The Origin of Igneous Rocks.
Van Hise—Correlation Papers, Archaean and Algonkian.
Iddings, Weed, Pirson, Washington—Classification of Igneous Rocks.

VIII.

ECONOMIC GEOLOGY.

Students are required to take part in the excursions to various mines in the neighborhood of Kingston.

Lectures on the origin, modes of occurrence and uses of the metals and their ores; materials used in the production of light and heat; minerals used in chemical manufactures; fertilizers; mineral pigments, salt, brine and mineral waters; building materials; cements; refractory materials; abrasive materials; gems and precious stones; miscellaneous.

Text-Books and Books for Reference.

Applied Geology, S. G. Williams.
The Non-metallic Minerals, G. P. Merrill.
Economic Geology of the United States, H. Ries.
Mineral Statistics, Geological Surveys of Canada and United States.

IX.

ROCKS AND ROCK WEATHERING.

This course is intended for students of Civil Engineering.

The occurrence, composition, texture, structure, and alterations of rocks will be considered with special reference to their effects on the workability of rocks and their uses as materials of construction.

Physiography and drainage will also be studied and a brief summary of geology of Canada will be given.
Books for Reference :—

Chapman's Geology of Canada.
Rocks, Rock Weathering and Soils Stones for Building. Merrill.
Decoration. Merrill.

BOTANY.

Professor: Rev. James Fowler, M.A., LL.D.
Tutor: Beatrice Birch.

Pass Class.

Class meets 10 a.m. Lectures embrace the following subjects:
General morphology of the plant body, segmentation, symmetry, arrangement of lateral members on the common axis, branch systems.

Special morphology of the members, (1) Roots, different form, duration, parasites ; (2) Stems, their forms, climbing stems, &c. ; (3) Leaf, phyllotaxis, venation, vernation, forms; (4) Trichomes, &c.; (5) Flowers ; (6) Fruits ; (7) Arrangements for cross fertilization, close fertilization.

Anatomy of plants (Histology), cell, cell-wall, protoplasm, Chlorophyll, starch, etc., formation of new cells, tissues, system of tissues.

Study of specimens belonging to leading orders.

Text-Books:—Spotton's Structural Botany and Wild Plants of Canada, Coulter's Plant Relations.

ANIMAL BIOLOGY.

Professor: A. P. KNIGHT, M.A , M.D.

Tutor: F. ETHERINGTON, M.D., M.R.C.S., EDIN.

Pass Class.

Lectures or demonstration will be given tri-weekly at 9 a.m.

The lectures treat of protoplasm, cells, cell division, reproduction, early stages of development, tissues, organs, differences between animals and plants, general view of invertebrata and of vertebrata, organic evolution, every-day lives of animals.

The Laboratory work consists of such dissections and demonstrations as will elucidate the subject of the lectures. The lectures are illustrated by diagrams, charts, and lantern transparencies. Text-book, General Zoology by C. W. Dodge. Animal Life by Jordan and Kellog.

MINING ENGINEERING.

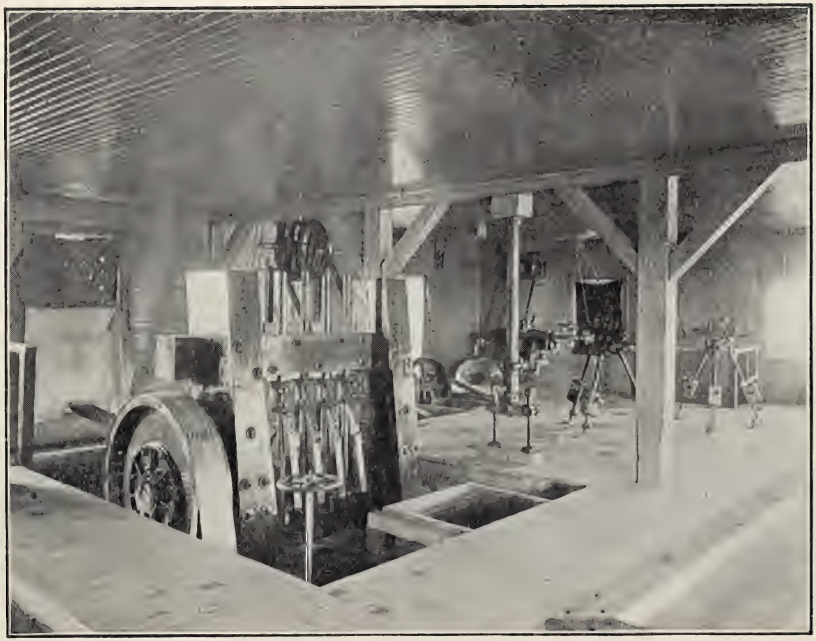
Professor: J. C. GWILLIM, B.Sc.

These lectures follow the general plan as given under the headings Mining I, Mining II and Mining III.

Mining and Milling machinery in actual operation together with lantern views assist these lectures. Current affairs in mlning are introduced as much as possible to give the subjects a living interest.

It is expected that mining students will help their apprehension of the work, and their future prospects, by going into the mining districts during the summer vacations. The knowledge of Geology, Chemistry, Mineralogy, Mathematics and Physics, finds its usefulness and necessity in the consideration of the following subjects.

MINING LABORATORY.



STAMP MILL AND ROCK DRILLS—MINING LABORATORY.

MINING I.

Ore Deposits. Conditions which produce and indicate them; their nature and origin; their affinity with certain conditions and rocks, and their classification. These lectures are supplementray to the study of economic geology.

Prospecting. Methods used in prospecting for lode, placer and coal mines. Location, laws and requirements of mineral prospects and their examination.

Mine Development. Preliminary consideration of conditions affecting the probable success or failure of mining operations in any particular locality; fuel, water, food supplies, transportation facilities and costs. Location of development workings. Choice of method of approach. Blocking out the ore for measurement. Systematic methods of obtaining accurate samples of ore, "in place" and on the dump. Methods of estimating the value of the mine.

Boring. Use of bore holes. Methods of boring. Boring by percussion. Methods by rods and by ropes. Boring tools, caseing; recovery of lost tools, etc. Rotary boring. Earth augers. Diamond drills worked by hand and by machinery.

Excavation. Tools for breaking ground. Hand tools; machine tools; steam excavators and dredges. Hand drilling. Power drills —types, management and maintenance. Theory and practice of blasting. Kinds and effects of explosives. Location of holes. Charging and firing holes, singly, simultaneously, and in series. Precautions in blasting. Substitutes for explosives.

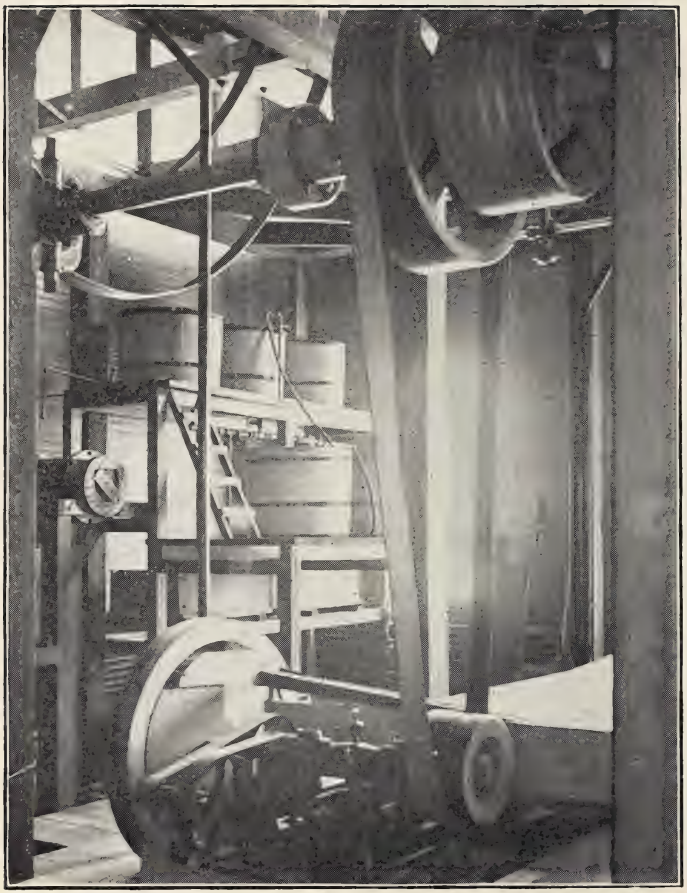
Mining Methods. Works for approach and underground communication. Shaft sinking. General principles. Protection of shaft mouth. Methods of sinking, ventilating, hoisting and unwatering during sinking. Winzes—location and methods of sinking and upraising. Tunnels, drifts, gangways, adits, slopes, contour levels. Advancing by single breast, and by benches. Trimming up and maintaining alignment.

Works for winning minerals. Stoping. Overhand and underhand stoping methods; their application and limitations. Cross-cut methods for wide veins. Contouring, and application of cross-cut methods to masses. Stripping. Methods suitable for soft ore bodies. Pillar and breast methods and their variations. Longwall advancing and retreating methods. Methods applicable to steeply inclined coal seams. Chutes; "ore mill"; loading bins, staging for overhand work; storage of "deads" or waste; gob walls; robbing of pillars, etc.

MINING II.

Placer Mining. Includes work as carried on by individual miners; by use of hydraulic equipment and by dredging.

Supports. Timber; kinds of timber used for supporting excavations; dry rot; processes used for the preservation of timber; modes of timbering levels, shafts, winzes, stopes and other excava-



WILFLEY TABLE AND CYANIDE PLANT—MINING LABORATORY.

tions; masonry and iron or steel supports for similar purposes; special methods of support in the cases of watery and running strata; compressed air, freezing and other processes; saving of timber resulting from the adoption of caving and filling methods.

Transportation. Underground. Wheelbarrows, their limit of efficiency. Cars—types, capacity, and maintenance. Tracks—gage; weight of rail; ballasted and unballasted and paved; turnouts; turn-tables and plates, cross-ties; sectional portable track. Haulage; man and animal power; rope traction by single, main and tail and endless rope, gravity roads; chain traction; underground locomotives; electric traction. Surface transportation; electric and endless cable traction; aerial wire rope tramways—single and double rope systems.

Hoisting. Head frames, temporary and permanent. Winding drums and engines—types and efficiency. Koepe endless rope system of hoisting. Cables—kinds, efficiency, maintenance and inspection. Buckets; kibbles; cages; skips. Safety appliances—to prevent fall of cage or skip; to prevent overwinding. Signalling.

Loading and Unloading Works. Dumping frames or chairs; tipples; elevating and conveying machinery for handling ores and coal; terminal facilities.

Drainage. Preventing access of surface water; adits or draining tunnels; siphons; removal of water by winding machinery; pumping plant; Cornish system; steam, compressed air and electrical pumping; bulkheads.

Ventilation. Composition of air; gases met with underground; causes of the deterioration of air; dangers of dust; natural ventilation, its limitations; ventilation by furnaces; mechanical ventilators of various kinds; distribution of air through the workings; method of testing the purity of the air; fire damp detection; methods of measuring and recording the volume of air passing through the workings.

Lighting. Candles; lamps fed by tallow, and by animal, vegetable or mineral oils; safety lamps; gas and electric lamps; expense of lighting.

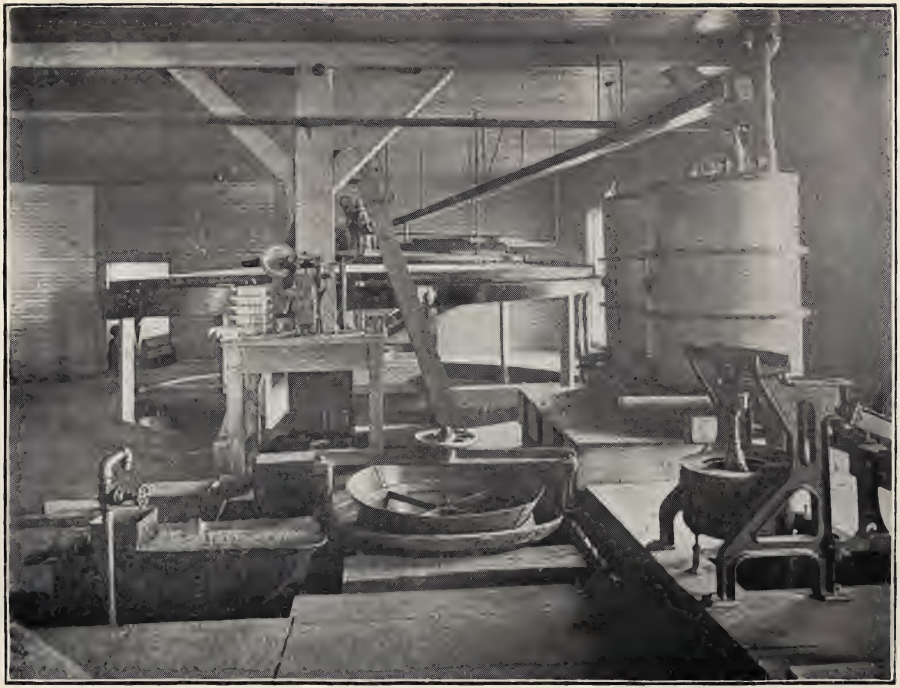
Descent and Ascent. Steps and slides; ladders; winding machinery; safety appliances; man-engine.

Principles of Employment. Day wages; contract work by weight or measure; contracts in which men have an interest in the values of the minerals extracted; administration, organization and business management; mine accounts.

Legislation. Special acts relating to mining properties and their operation.

Accidents. In hoisting, traction, roof falls, blasting, sudden ingress of waters, explosion, mine fires; rescuing of miners under various conditions; fire extinguishment, etc.

Mine Examination and Valuation.



CLASSIFIERS AND SLIME TABLE—MINING LABORATORY.

DESIGNING AND MINING PROJECT.

Designing and Mining Project. Mine and mill designs and mapping. Practise in the methods of underground surveys.

MINING III.

Advanced course for those students who wish to specialize in mining. It will include the study of mine management, accounts, the commercial side of mining and a knowledge of current affairs in mining.

Books for Reference:—(1) C. LeNeve Fosters' Ore and Stone Mining. (2) Coal and Metal Miners' Pocket-book. (3) H. W Hughes' Coal Mining. (4) Current Mining Journals.

THE MINING AND METALLURGICAL LABORATORIES.

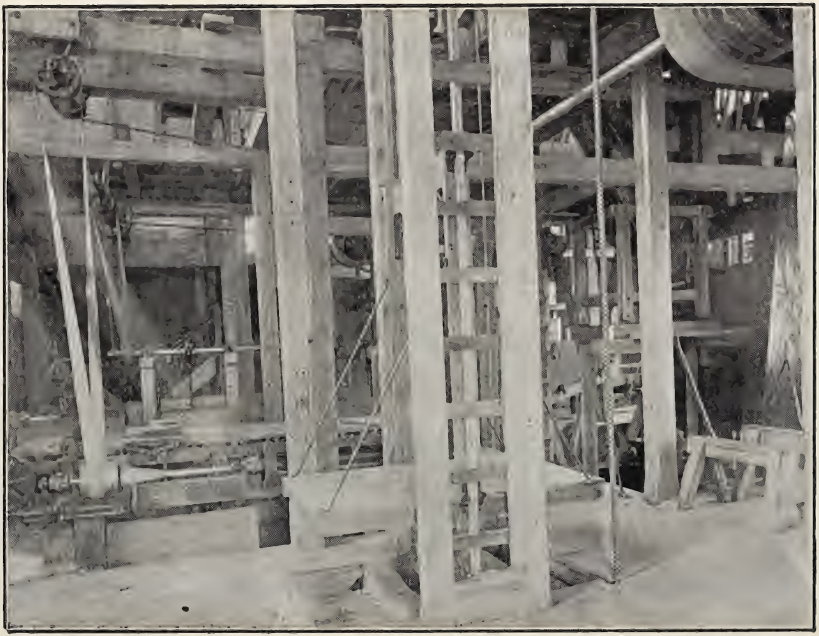
These are equipped for the testing of ores in small lots from different mining districts.

The machinery used is in most cases of standard sizes and the ores treated of sufficient quantities to give results which are about the same as commercial practice would give. The uses of the Mill and Laboratories are to furnish training and illustration, to experiment with various processes, and to give help at very reasonable rates to those who are seeking some method of treatment. The ores received are sufficient in quantity and variety to illustrate most of the usual methods of treatment found in actual practice. The work is divided into three main portions.

(1) Stamp Milling, Cyanidation, Chlorination and other Metallurgical processes in the term before Christmas.

(2) Concentration processes in the term after Christmas.

(3) In the Metallurgical Laboratory small quantities of ores are treated by smelting in blast or reverberatory furnaces, and experiments are conducted on the refining

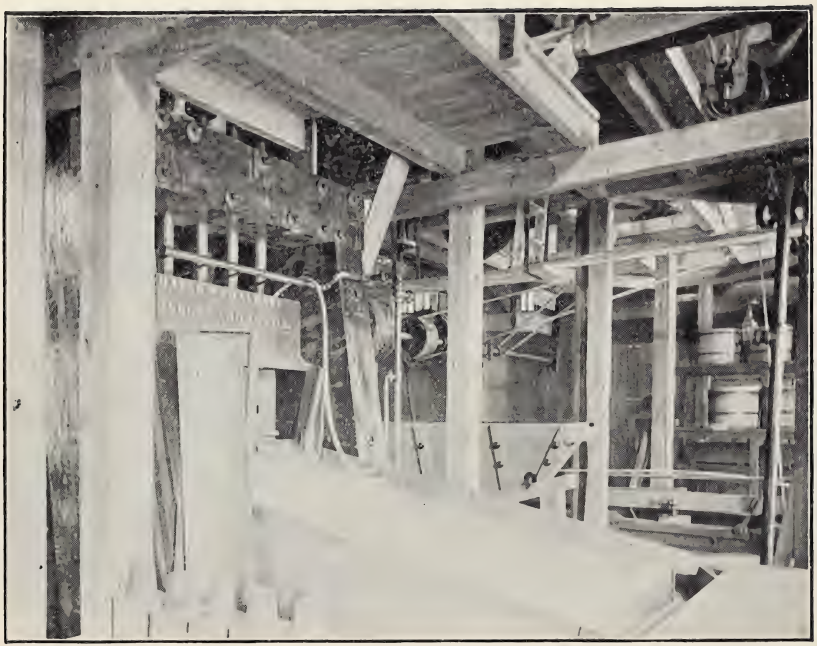


MINING LABORATORY—FRUE VANNER AND JIGS.

of metals such as lead and copper; on the determination of the properties of iron and steel, and in connection with pyrometry, gas analysis, and the operation of the electric furnace.

The equipment of mill and laboratory as it stands at present consists of the following:—10 in. by 7 in. Blake jaw crusher; 16 in. high speed rolls; 5 stamp battery 850 lbs. stamps with automatic feeder; 10 in. cone grinder; No. 0 Krupp Ball Mill; impact screen; inlet discharge classifier; vertical line classifier; U-tube classifier for slimes; perforated board classifier for slimes; cone classifier and glass tube classifiers; 3 compartment spitzkasten; 3 compartment Hartz jig; 2 compartment Evans high-speed jig; 1 Vezin jig; 4 ft. Frue Vanner; Wilfley table (riffle washer); 16 ft. modern Evans buddle; Wetherill magnetic concentrator; Sturtevant exhauster and blower; German dust tower; Heald and Sisco centrifugal pump; Frenier and Sons' spiral sand pump; Cazin water-motor; Northey mine pump; shaking screen; centrifugal machine for slime treatment; Johnston filter press for slime treatment; Ingersoll-Sergeant rock drill; Mac Machine Company's balanced valve rock drill; Rand rock drill; tripods for rock drill; drifting column for rock drill; Jackson's hand power rock drill; 25 H. P. Robb engine; barrel chlorination plant (350 pounds capacity); cyanide plant (1,000pounds capacity); reverberatory roasting furnaces,small oil fired reverberatory, gas muffle furnace, soft melting metal furnace, electric furnace; No. 3 Reichhelm blower; 2 H. P. electric motor.

A convenient assay laboratory has been fitted up in connection with the mill, where, pyrometry, calorimetry gas analysis, and all the wet and fire assaying required for checking the mill work can be carried on.



MINING LABORATORY—FRONT OF STAMP MILL.

METALLURGY.

Professor: S. F. KIRKPATRICK, M.Sc.

METALLURGY I.

A thorough drilling in fuels, the special metallurgical uses of each kind, determination of calorific power, experimentally and by calculation from composition, calorific intensity and methods of pyrometry, charcoal manufacture, coals, coke, coking methods physical and chemical tests of coke, bye-product coking, producer gas and its manufacture in modern approved appliances, liquid fuels, etc. This is followed by a discussion of the physical properties of the common metals, the effect of different impurities, and the constitution and character of the more important alloys.

Furnaces. Furnaces, their kinds and development; special uses; principles of construction. The modern iron blast-furnace; low shaft furnaces for lead and copper—types and relative efficiency, reverberatories for solid and gaseous fuel; regenerative furnaces; retort furnaces, etc.

Slags. Types of slags; functions of slags; properties of fluxes, calculation of slags.

Supplying Air to Furnaces: Blowers and blowing engines; hot blast stoves; resistance of column of fusion; regulation of blast.

Roasting and Calcination. The preparation of ores for smelting by roasting in heaps, kilns, reverberatories, revolving, and various mechanical roasters is fully explained.

ORE DRESSING.

Ore Dressing. Picking and cobbing; crushing methods, and comparative effects in liberation of valuable minerals from gangue; sizing by screens and trommels; theory of fall of bodies in water; classification by the spitzkasten and spitzlutte; theory of jigging; types of jigs; sizing *versus* classification in the preparation of ores for jigging; friction-service concentrators; riffle-washers; magnetic separators—types and application; special modification of concentrators, etc., for coal washing; oil concentration; schemes of practical working plants for all classes of ores.

Gold Milling. Free-milling plants; types of stamp mills, their efficiency and limitations. Construction and maintenance of stamp mills. Other methods of crushing for amalgamation. Principles and practice of amalgamation.

METALLURGY II.

Hydro-metallurgy of gold and silver, including cyaniding and chlorination of gold ores and leaching of silver ores with hyposulhpite.

Milling and amalgamation of silver ores.

Metallurgy of copper, including treatment of native copper and sulphide ores by concentration and smelting, reverberatory and blast furnace matting, pyritic smelting, refining, and hydro-metallurgy.

Metallurgy of lead, including reverberatory and blast-furnace practice, softening, desilverising, refining, etc.

Metallurgy of iron and steel including preparation of the ore for smelting, production of pig-iron in the blast furnace, conversion into wrought iron in the puddling furnace, manufacture of steel by the crucible, Bessemer and open-hearth processes.

Metallurgy of zinc, manufacture in retorts and muffles.

Metallurgy of nickel.

METALLURGY III.

Electro-metallurgy; introductory course in electro-chemistry followed by the consideration of the electric smelting of aluminium, copper, magnesium, iron, etc.

Also the consideration of the ordinary methods of recovering tin, mercury, arsenic, antimony, etc., from the ores.

METALLURGICAL READING.

The student will be required to study more particularly the metallurgy of some special metal or metals, obtaining the required text-books on the subject and reading in the library so as to be able to pass an examination on the subject in the spring.

Text-Books and Books of Reference.

Metals, by Huntington & Macmillan (3rd year).

Introduction to the Study of Metallurgy. W. C. Roberts Austin.

Hand-book of Metallurgy, by C. Schnabel.

Gold, the Metallurgy of. T. K. Rose.

Stamp milling of Gold Ores. Rickard.

Practical notes on the Cyanidi Process. F. L. Bosqui.

Modern Copper Smelting. E. D. Peters.

Metallurgy of Lead. H. O. Hofman.

Manufacture and Properties of Structural Steel. H. H. Campbell.

Steel. A manual for steel users. William Metcalf, (4th. year).

Metallurgy of Steel. F. W. Harbord.

Practical Electro-Chemistry. B. Blount.

Electric Smelting and Refining. Borchers & McMillan.

Richards' Ore Dressing.

THERMODYNAMICS.

Professor: L. W. GILL, M.Sc.

Before taking this class students must have passed in Mathematics I. and II.

I.

Fundamental laws of Thermodynamics. Behaviour of gases under varying conditions. Theory of air compressors and air motors. Transmission of power by compressed air. Properties of steam and elementary theory of the steam engine. Thermal and mechanical efficiency of heat engines. Operation of simple valves and governors. Measurement of power. Elementary theory of gas engines.

Simple laboratory experiments in the second term.

II.

Theory of refrigerating machines and systems. Entropy and enfropy-temperature diagrams. Superheated steam. Performance of actual engines. Influence of size, speed, and ratio of expansion on economy. Steam jackets. Compound and triple expansion engines. Expansion valves. Advanced theory of gas and oil engines. Steam turbines.

Experiments in Thermodynamic Laboratory.

THERMODYNAMIC LABORATORY.

The equipment of this laboratory includes an air compressor, centrifugal fans, centrifugal pumps, reciprocating pumps, steam engines, condensers, calorimeters, and dynamometers, together with all the auxiliary apparatus required for making tests and carrying on experimental work. All apparatus is of a standard type and latest design.

A considerable part of the practical work in Thermodynamics is carried on in connection with the central heating and power plant, which supplies heat and power to the various college buildings. This plant affords exceptional advantages for carrying on experimental work, having been designed with due regard to this feature.

A very important part of the work consists in carrying out commercial tests on various steam plants connected with the industries of Kingston.

GENERAL ENGINEERING.

Professor: ALEXANDER MACPHAIL, B.Sc.

This subject embraces the physical properties of materials used in the different branches of engineering and the principles involved in the theory of beams, columns, and structures.

GENERAL ENGINEERING I.

Materials of Construction.

Lectures comprise: Strength and quality of timber, stone, brick, cement, mortar, and concrete; physical properties of the metals and alloys used in engineering, and effects of impurities in them; testing for tensile, compressive and transverse strength.

Mechanics of Materials.

Resistance and elasticity of materials; Theory and design of simple and cantilever beams; pipes, cylinders, and riveted joints; analytical determination of stresses in simple framed structures; dead and live loads; centres of gravity; moments of inertia; shearing force and bending moments.

Graphical Statics.

Graphical representation of stresses in simple framed structures; graphical determination of centres of gravity; shearing forces and bending moments.

Lecture hours:—Monday, 11 a,m. Thursday, 9 a.m.

Books of Reference:—Merriman's "Mechanics of Materials."
Merriman's "Strength of Materials."
Thurston's "Materials of Construction."
Merriman's "Roofs and Bridges," Part II.

GENERAL ENGINEERING II.

Mechanics of Materials.

Analysis of restrained and continuous beams and columns; torsion of shafts; combined stresses; flexure of beams and theorem of three moments; plate and lattice girders and columns; Resilience and fatigue of materials; initial and temperature stresses; earthworks, retaining walls and dams; arches and arched ribs; suspension bridges.

Graphical Statics.

Graphical determination of stresses in roof trusses, bridges, cranes, earthworks, retaining walls, dams, arches, arched ribs, cantilever and suspension bridges.

Theory of Structures.

Girders, roofs, and bridges; selection of types with reference to span, loading, head-room, cost, aesthetic design and other considerations; relative advantages of riveted and pin connections; wind bracing and stiffening trusses; trestles and towers.

Lecture hours:—Monday, 2 p.m. Friday, 2 p.m.

Books of Reference:—Bovey's "Theory of Structures."
Merriman's "Mechanics of Materials."
Merriman's "Roofs and Bridges," Part I, II, III.

GENERAL ENGINEERING III.

This course is for Civil Engineering Students, and comprises special work in cement and Testing Laboratories, and advanced work in graphical statics.

ENGINEERING FIELD WORK.

Professors: A. K. KIRKPATRICK, C.E.
ALEXANDER MACPHAIL, B.Sc.

The classes in this subject are practical, and enable students to become perfectly familiar with the instruments and take charge of the different departments of Surveying work.

ENGINEERING FIELD WORK I.

Students who have completed Surveying I and II will be present at the School of Mining at 10 a.m., Friday, August 31st, 1906, to commence Field Work, and must procure the prescribed Field Book and draughting material. The class will be under canvas until September 25th, receiving full instruction in practical work in Stadia, Hydrographical, Land, Railway and

other branches of Surveying II. The class is under camp organization. The tents, army sheets, camp utensils, &c., are furnished by the School. Each student must provide himself with a pair of heavy blankets or other bedding, draughting instruments, note book, detail, profile, cross section, and tracing paper. The expense of provisions, cooks, and personal transport must be borne by the students, an advance of $20.00 being made to cover same, any balance returned at expiration of Survey.

Throughout the work, the class will be in the field daily, and in the evenings must complete notes and draught the day's work. All notes and draughting must be completed by September 25th, 1906, for qualification. Students must notify the Secretary of their intention to attend this class not later than August 15th, 1905, so that all arrangements may be completed before September 1st, 1906. Students should also provide themselves with any Engineers' Field Books, Tables of Logarithms, &c., they may be able to procure.

ENGINEERING FIELD WORK II.

This work is for Civil Engineering Students only and will consist of practical work in Railway Location, Switch Problems, and work connected with Bridge and other Surveys. When weather does not permit of outdoor work, the class will be employed draughting the results of the practical work or working of problems.

Qualification based on term work.

Students must provide themselves with Searle's Field Engineering, $3.00.

ENGINEERING FIELD WORK III.

For Civil Engineering students only, consists of practical work in Railway, Structural and Hydraulic Engineering.

When weather does not permit of outdoor work, time alloted will be devoted to the draughting of practical work done, or solution of problems.

Qualification based on term work.

Text-Book: Searle's Field Engineering.

ELECTRICAL ENGINEERING.

Professor: L. W. GILL, M.Sc.

I.

Fundamental Principles.

Electro-magnetism and electro-magnetic induction. The magnetic circuit. Induction of electric currents. Power and heat from electric currents. Self and mutual induction. Elementary theory of alternating and direct current generators and motors. Arc and incandescent lighting. Common methods of transmission and distribution of currents.

II.

Elementary Electrical Engineering.

Measurement of magnetic quantities. Further points in the theory of the magnetic circuit. Hysteresis and hysteresis loss. More advanced theory of self and mutual induction. Laws governing the flow of alternating currents in circuits containing resistance, inductance and capacity. Transformers, their construction and operation.

Elementary laboratory work.

III.

Advanced exercises in drawing, with special attention to electrical apparatus.

IV.

Direct Currents.

Advanced theory of direct current machines. Energy losses, Commutation and armature reaction. Series, shunt, and compound machines. Efficiency, operation and control of direct current generators and motors. Theory and practical applications of storage batteries.. Boosters. Applications of direct current in commercial work.

Laboratory experiments with standard types of direct current apparatus.

V.

Alternating Currents.

Theory of alternating current generators. Synchronous and induction motors. Rotary converters. Measurement of power in polyphase systems. Phase changing. Multiphase systems. Transmission of power by alternating currents. Applications of alternating current apparatus.

Laboratory experiments with standard types of alternating current apparatus.

VI.

Drawing and Design.

Design of direct and alternating current apparatus.

The student will be required to design and make complete drawings of one or more pieces of apparatus.

ELECTRICAL LABORATORIES.

The various laboratories are the Dynamo Laboratory, for testing generators, motors and transformers; the Standardizing Laboratory, equipped for calibrating meters and instruments of precision; and the Research Laboratory, in which original experiments are carried on.

The Dynamo Laboratory is equipped with standard types of direct and alternating current generators and motors, together with all the necessary accessory apparatus, such as meters, rheostats, etc. The experimental machines are driven by direct connection to motors which receive their power either from the main power plant or from a storage battery, which gives a very steady supply of current often necessary in experimental work.

An important part of the work is the carrying out of commercial tests on various local plants, while in normal operation.

RAILWAY ENGINEERING.

Professor: A. K. KIRKPATRICK.

RAILWAY ENGINEERING I.

Construction.

Lectures comprise: The effects of grades and curves on traffic. Calculations of quantities, overhaul, &c. Duties of resident engineer and his staff on construction. Calculation of progress and final estimates. Records and methods of keeping same. Railway act of Canada in relation to construction.

Lecture hour—Wednesday, 9 a.m.

RAILWAY ENGINEERING II.

Construction.

Lectures comprise: Design of box and arch culverts. Estimation of waterway required. The protection of embankments. Different methods of obtaining and preparing foundations for structures. Pile and frame trestles. Methods of proceedure in rock and earth excavations. Tunneling. Ballasting and tracklaying. Explosives and their uses.

Lecture hour—Monday, 10 a.m.

RAILWAY ENGINEERING III.

Maintenance.

The upkeep of track, bridges, and buildings; their inspection and methods of repairs and renewals. The duties and responsibilities of the persons in charge.

Book of Reference:—Railway Track and Track Work by Tratman.

Lecture hour—Thursday, 9 a.m.

Structures.

General design of railway buildings, *i.e.*, stations, freight sheds, round houses, turn tables; coal handling appliances, sand and water stations, elevators, heating and ventilating of buildings.

Lecture hour—Wednesday, 1 p.m.

MUNICIPAL ENGINEERING.

Professor: A. K. KIRKPATRICK.

Water Supply.

Lectures comprise: Municipal water supply. Rainfall. Source of Supply. Quantity, quality and purification of water. Distribution, designing, and details of construction. Domestic systems.

Lecture Hour—Monday, 1 p.m. 2nd Term.

Sewage and Sewerage.

Lectures comprise: The various systems of collection, removal, and disposal of sewage, including septic tanks, contact filter beds, and disposal of sludge. Proportioning the size. Grade and flow in sewers. Methods of ventilation, flushing, and inspection. Methods of construction and material used.

Lecture Hour—Tuesday, 11 a.m. 2nd Term.

Streets.

Lectures comprise: Layout, grades, and roadbeds. Various kinds of pavements, and methods of construction, cost, and durability. Gutters, curbs, and gullies. Various kinds of walks; methods of construction; materials used; average life and cost.

Lecture Hour—Tuesday, 11 a.m. 1st Term.

City and Highway Bridges and Electric Railways.

Aesthetic design of bridges of different types; details of construction. Determination of loads and analysis of stresses taken under General Engineering II. Electric Railways—Subgrade, rails, ties, curves, switches, pavements, power, grades, and bridges.

Lecture Hour—Monday, 1 p.m. 1st Term.

HYDRAULIC ENGINEERING.

Professors: J. C. Gwillim, B.Sc.; A. K. Kirkpatrick.

Comprises the study of Hydraulics, Canals, Harbors, River improvements, Water Power, Irrigation, &c.

HYDRAULIC ENGINEERING I.

Professor: J. C. Gwillim.

Hydraulics.

Application of Hydrostatic pressure in the case of dams, gates and pipes. Flow of water and measurement of its volume by various orifices and weirs. Flow in open channels, streams, ditches, flumes, &c., and the use and application of these conductors of water. Flow through tubes and pipes. Use of pipes as conductors of supply for domestic and power purposes. Dynamic and static pressure as applied to motors for power purposes. The efficiency of various water wheels, turbines, &c. Naval hydromechanics, including the propulsion of bodies through water.

Lecture Hours—Tuesday and Thursday, 10 a.m.

Text-Book: Merriman's "Hydraulics."

HYDRAULIC ENGINEERING II.

Professor : A. K. KIRKPATRICK.

Canals, Harbors and River Improvements.

Canals.—Economy in design of dimensions, based on traffic, Determination of cross section of canal. Materials required for banks, and method of construction. Dredging, blasting and improvements of existing water-way. Design of locks, gates, conrolling mechanism, &c. Hydraulic lifts.

Harbors.—Advantageous characteristics. Construction of piers, lighthouses, breakwaters, &c. Dredging, blasting, &c., for channels, Buoys, channel marks and range lights.

River Improvements.—Dredging of existing water-ways for navigation. Protection of channels, &c.

Lecture Hour—Tuesday, 2 p.m.

Book of Reference : Watt's Improvement of Rivers.

HYDRAULIC ENGINEERING III.

Professor : A. K. KIRKPATRICK.

Water Power.

Natural watercourses. Dams for water power. Construction of earthen, loose rock and masonry dams and appendages. Storage reservoirs. Spillways and outlet sluices. Development of natural water powers. Transmission of power. Measurement of water power. Turbines and water wheels.

Design of hydraulic power plants.

Lecture Hours—Monday, 9 a.m.

Book of Reference : "Water Power," Jos. P. Frizell.

HYDRAULIC ENGINEERING IV.

Professor : A. K. KIRKPATRICK.

Irrigation.

Hydrography. Precipitation, runoff, and stream flow. Evaporation, absorption and seepage. Alkali drainage and sedimentation. Subsurface water sources and sewage for irrigation. Irrigation canals. Classes of irrigation works, alignment, slope and cross-section headworks, and division weirs, regulators and escapes. Distributaries. Application of water and pipe irrigation. Estimates.

Lecture Hour—Tuesday, 9 a.m.

Book of Reference: Irrigation Engineering, H. M Wilson.

STRUCTURAL ENGINEERING.

Professors: A. K. KIRKPATRICK, ALEXANDER MACPHAIL.

Students about to take Structural work should have completed Mathematics I and II, and General Engineering I.

STRUCTURAL ENGINEERING I.

Building Construction.

Selection of building materials, stone, wood, brick, &c. Foundations of buildings, walls, &c. Design of floors. floor beams, walls, roofing materials and other parts of buildings. Joints in wood, stone and iron.

Stone cutting and masonry. Concrete, and reinforced concrete.

Students will be required to make independent designs of the various structures dealt with in the lectures.

Lecture Hour—Wednesday, 10 a.m.

STRUCTURAL ENGINEERING II.

Bridge Engineering.

Lectures comprise: Examination of bridge site; economic number of spans and piers. Selection of truss or trusses.

Wooden and steel trestles, &c.

Design of foundations, abutments and piers.

Coffer dams and caissons.

Approaches. Ice breakers, &c.

Flooring. Hand railings. Guard rails. Stringers, floor beams, ties, &c.

Shop work and assembling.

Specifications, details, estimates and bills.

Two hours per week will be devoted to design of structures.

Lectures—Friday, 2 p.m.

STRUCTURAL ENGINEERING III.

Design of Structures.

Lectures will comprise the design of details in Bridge trusses and other structures, and the practical application of General Engineering I and II.

Projects will be given to the class in Roof and Bridge Design according to Standard Specifications usually consisting of a plate girder, rivetted truss, pin-

connected truss, &c., which must be executed during the 4 hours allotted to this branch, complete stress sheets, working drawings, estimates, &c., being required.

Qualification will be based on term work.

Lecture Hour—Thursday, 1 p.m.

Text-Books: Merriman's Roofs and Bridges. Pts. I-IV.
"Cambria Steel" Hand-book.

MECHANICAL ENGINEERING

Professor: L. W. GILL, M.Sc.

I.

Machine Design.

Simple and compound stresses. Allowable stress under various conditions. Straining actions in machines. Elementary principles of design. Application of principles to the design of bolts, cotters, rivetted joints, pipes and cylinders, bearings and journals, shafts and couplings. Belts, ropes and pulleys.

II.

Dynamics of Machines.

Dynamics of rotation. Efficiency of the screw, taking friction into account. Elementary dynamics of the steam engine. Fluctuation of crank effort. Speed and energy of fly wheels. Balancing of engines. Governors. Centrifugal machines.

III.

Mechanical Drawing.

Advanced exercises in drawing. Designs of simple machines.

IV.

Elementary Mechanical Engineering.

Steam production. Fuel and combustion. Boilers and boiler accessories. Boiler furnaces. Mechanical stokers and mechanical draft. Steam distribution. Pumps. Gas and gas production.

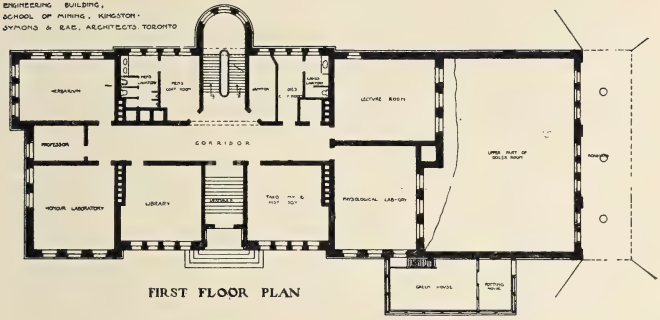
V.

Mechanical Engineering.

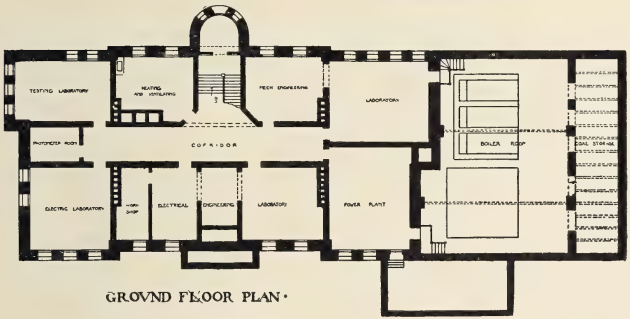
Condensers and cooling towers. Design of steam plants. Performance of steam driven machinery. Perfor mance of gas and

ENGINEERING BUILDING.

ENGINEERING BUILDING,
SCHOOL OF MINING, KINGSTON.
SYMONS & RAE, ARCHITECTS, TORONTO

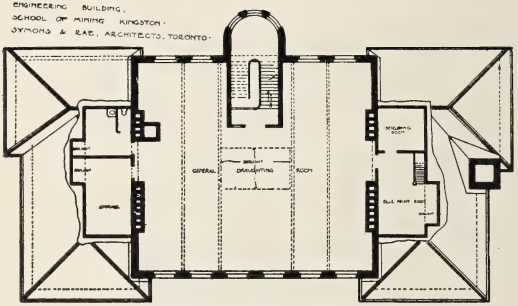


FIRST FLOOR PLAN

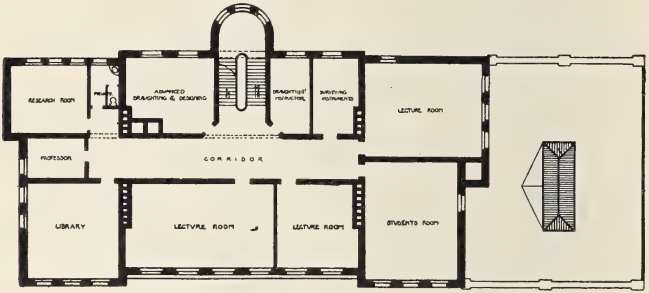


GROUND FLOOR PLAN.

ENGINEERING BUILDING,
SCHOOL OF MINING KINGSTON.
SYMONS & RAE, ARCHITECTS. TORONTO.



THIRD FLOOR PLAN



SECOND FLOOR PLAN

oil engines. Friction and lubrication. Transmission and distribution of power by steam, shafting, belts, compressed air, and electricity. Elements of locomotive engineering. Experimental work in Thermodynamics and Mechanical Engineering Laboratory.

VI.

Mechanical Drawing and Design.

Boiler and engine design. Water and air pumps. Specifications.

The complete design of some complex machine and the preparation of the requisite drawings, tracings and blue-prints.

MECHANICAL ENGINEERING LABORATORY.

The Mechanical Engineering Laboratory is equipped with such apparatus as will give the student in Mechanical Engineering a thorough understanding of the practical details and the operation of boilers, engines, pumps and compressors, gears, valve gears, governors, etc. An important feature of the work is the carrying out of tests on the central heating plant, involving the use of superheated steam. This plant is equipped with all modern appliances and affords an excellent opportunity for the practical study of the production of steam on a large scale. Tests are also made on various steam plants located in the vicinity of the School.

In connection with the practical work in Mechanical Engineering an investigation of machine tools is made in the workshop. Special attention is here given to high speed machines using self-hardening steel cutters.

MECHANISM.

Lecturer: H. F. SCHMIDT.

Students who take this class are expected to have passed in the subjects of Mathematics I and II.

The course consists of twenty-five lectures during the first and second terms. It includes the systematic study, not only of the motions and forms of the various mechanisms occurring in machines, and the manner of supporting and guiding the parts, independently of their strength, but also of the design of gear teeth, and the study of the mechanisms found in modern machine tools. The lectures are illustrated by working models of mechanical elements and their combinations.

Students will accompany the lecturer on visits to the manufacturing establishments of the city in which representative machinery is employed, and explanations of the various pieces of mechanism will be given *in situ*.

DESCRIPTIVE GEOMETRY.

Professor: Alexander Macphail, B.Sc.

This subject deals with the methods of representing objects on one or more planes so that the relative positions of the various parts can be clearly represented to the eye, and accurately determined by measurement. It deals with the various methods employed in the graphical solution of many problems arising in engineering design, and generally with the principles underlying all constructive drawing. The main object of the work is to develop the faculty of mentally picturing the relative positions of the different parts of a machine or structure, an essential process in all constructive work.

The work consists of one lecture per week, and two hours per week devoted to the working out of problems in the draughting room. The problems deal with the straight line and plane and solid figures, intersection of plane and curved surfaces, and axometric projections.

Text Book:—Elements of Descriptive Geometry. (Millar).

DRAWING.

DRAWING I.

Professor: A. K. KIRKPATRICK.

The lectures and practical work are arranged with a view to preparing students for the subjects of Mechanical Drawing, Descriptive Geometry, &c., in the different branches of Engineering.

Each student at the opening of the term must provide himself with a set of drawing instruments, scales, set squares, T square, thumb tacks, pens, pencils, inks and drawing paper of approved standard.

Attendance of at least five hours a week is required, and students must arrange for these at commencement of term.

The class standing will be based on the term work.

The lectures will comprise: Practical Geometry of the line, circle, ellipse, parabola, hyperbola, spirals, cycloids, &c.; simple projection of planes and solids; lettering, &c.

Problems will be assigned to the class in the form of plates.

Books of Reference: Rawles' Practical Geometry.

Lecture Hour—Thursday, 1 p.m.

DRAWING. II.

Professor: L. W. GILL.

Elementary principles of Mechanical Drawing. Sketching. Preparation of working drawings of valves, simple parts of machines etc. Tracing and blue-printing.

The student is required to make dimensioned sketches of machine parts, and from these sketches make drawings.

DRAWING III AND IV.

Extension of work taken up in drawing II.

SURVEYING.

Professor: ALEXANDER MACPHAIL, B.Sc.

All branches of Surveying receive full consideration. During the outdoor instruction students are given every opportunity to become familiar with the instruments. Notes of all field work are plotted in the draughting room.

SURVEYING I.

Lectures in Second Term.

These comprise: Classification of the different branches of Surveying. Description, use and adjustment of chains and tapes. Adjustment and use of transits, levels, clinometers, compass, &c.

Principles of Chain Surveying and Field Geometry.

Methods of taking field notes.

Lecture Hour—Monday, 10 a.m. (Second term only).

Books of Reference: Raymond's Plane Surveying.
Gillespie's Surveying. Pt. I.
Hand-book for Surveyors—Merriman.

SURVEYING II.

Lectures First Term.

Principles of instrumental surveys. Compass and Transit Methods of Plotting, distributing errors, land survey computations and laying ont of land into required areas. Levelling. Profiles. Cross sections. Farm, Topographical and Stadia surveys. Earthwork computations. Grading. Laying out curves, simple, compound and reverse.

During the Fall term as many of the prescribed hours as possible will be devoted to field work.

Lectures Second Term.

Civil Surveying – comprising Simple Triangulation, Plane Table and its use on Topographical work. Hydrographical surveying. Surveying for Engineering works. Simple, Angular and Barometric Levelling. Railway Surveying.

Lecture Hours—Wednesday and Friday, 9 a.m.

Text-Books: Raymond's Plane Surveying.
Merriman's Hand-book for Surveyors.

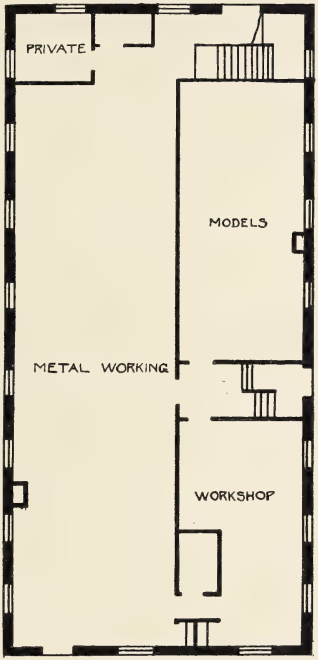
Books of Reference: Field Books by Searles, Shunk and Godwin.
Johnson's Plane Surveying.

SURVEYING III.

This course is for Civil Engineering Students of the second year, and consists of 2 hours per week practical work in the field and draughting room. Students will be required to undertake independent surveys connected with municipal work. Hours for this work will be assigned at the commencement of the term.

MECHANICAL WORKSHOP
SCHOOL OF MINING KINGSTON ONT.

SECOND FLOOR PLAN



FIRST FLOOR PLAN

MECHANICAL LABORATORY—IRON DEPARTMENT.

SURVEYING IV.

Lectures.

Dominion Land Surveying.—Comprising the methods adopted in Survey of Dominion Lands, as laid down in Manual of Survey, issued 1903, by the Dominion Government.

Geodesy.—Comprising the principles and methods of procedure in extended triangulation. Determination of Latitude and Azimuth. Angular Levelling.

Mine Surveying .—Principles involved in Mine Surveys, and problems connected with underground work.

Lecture Hour—Fridays, 11 a.m.

Books of Reference: Manual of Survey for D.L.S.
Gore's Elements of Geodesy.
Brough's Mine Surveying.

SURVEYING V.

For Civil Engineering Students Only.

Railway Surveys.—Problems in Location, Grades, Switches, Turnouts.

Engineering Work.—Bridge Surveys, Surveys for dams, building sites, reservoirs, &c., with practical problems connected with same.

Text-Books: Searle's Field Engineering.

Books of Reference: Engineer's Field Books by Godwin, Shunk, Hank, Trautwine, &c.

MINING LAW.

Lecturer: J. Bawden, Barrister-at-Law.

Law of Property in Mines :

Contracts for purchase and lease of Mines ; Options ; Mines Act, R.S.O., chapter 36 and amendments.

Mining Companies Incorporation Acts :

Liability for misrepresentation in prospectus.

Mine Accidents ;

Statutory Rules ; Inspector's Enquiry ; Employer's Liability.

FIELD CLASSES IN GEOLOGY AND PROSPECTING.

The attention of students and others is called to the practical study of geology, mineralogy and prospecting methods. Some of the chief mineral localities of the Kingston district are visited each session, and abundant opportunities are offered for collecting

specimens and studying the modes of occurrence of substances of economic value. These excursions are compulsory for all students in geology and mineralogy after the first year. The cost will not exceed $10.00.

MINERAL AND GEOLOGICAL SPECIMENS.

It is desired to make the collections of this school as complete and representative as possible of the mineral resources of Canada. Specimens presented to the School will be named free of charge. Good specimens presented to the School will be labelled with the name of the donor and the locality, and will be preserved in the museum for reference.

Samples under 25 lbs. in weight may be sent by express; over that weight by freight.

Specimens should be addressed to the Professor of Mineralogy, or to the Professor of Geology, School of Mining, Kingston, Ont.

GIFTS OF REPORTS, PERIODICALS, &c.

1905.

Canadian.

Geological Survey of Canada, Ottawa.
- Geological Survey Report, Vol. XIII.
- Summary Report for 1903, 1904. (3 copies.)
- List of Publications of Geological Survey.
- Supplementary list of Publications.
- Map of W. Kootenay District. (2 copies.)
- Map of Boundary District. (2 copies.)

Department of the Interior, Mine Branch.
- Mica, its occurence, &c. (2 copies)
- Asbestos, its occurence, &c. (2 copies.)

Department of Agriculture, Ottawa.
- Statistical Year Book, 1904.

Department of Marine and Fisheries.
- Report of Meturological Service for 1903.

Canadian Mining Manual, 1904.

Ontario Bureau of Mines.
- Report for 1904, Parts I and II. (2 copies.)
- Report for 1905, Part II.

Ontario Department of Agriculture.
- The Municipal Drainage Act of Ontario.
- The Consolldated Municipal Act of Ontario.

Quebec Department of Mines.
- Mining operations in P, Q., 1904. (2 copies.)

British Columbia Department of Mines.
Report of Minister of Mines, 1904.
Bulletin Prov. Bureau of Mines. Bull. 1, 2.
Bulletin of Legislative Assembly, No. 19. (2 copies.)
Bureau of Provincial Information, Bull. 10.

Transactions of the Canadian Institute, Vol. VIII, Pt. 1.

British and Colonial.

Geological Survey of Great Britain.
Hand-book to Collection of Minerals of British Islands in the Museum of Pract. Geology, London.

New South Wales.
Annual Report of Department of Mines, 1904.

Victoria.
Annual Report of Secretary for Mines and Water Supply, 1904.

West Australia.
Report of Department of Mines, 1903.
Statistical Register, 1903, Part 1-11.
Report of Royal Commission on Ventilation and Sanitation.

Queensland.
Annual Report of Under Secretary for Mines, 1904.
Department of Mines, Publications, Nos. 196-200.

South Australia.
Record of Mines of S. A., Supplementary Issue, 1905.

New Zealand.
Papers and Reports on Minerals and Mining, 1904 and 1905.
Rocks of Cape Colville Peninsula, Volume I.

India.
Memoirs of Geological Survey, Vol. XXXV, Part 3, 4.
Records of Geological Survey, Vol. XXXI, Part 3, 4.
Vol. XXXII, Part 1. 2.

Transvaal.
Annual Report of Government Mining Engineer for year ending June, 1904.
Half-yearly Report of Government Mining Engineer, Dec., 1904.

Transactions of the Institution of Mining and Metallurgy, London, Vol. XII, XIII.

Transaction of the Australasian Institute of Mining Engineers, Vol. X.

Proceedings of the Chemical and Metallurgical Society of South Africa, Vol. III.

American and Foreign.

United States Geological Survey.
25th Annual Report.

Monographs 48, Pts. 1 and 2, Atlas (of No. 32.)
Bulletins 235, 237-239, 242-264, 266, 267, 271.
Water Supply and Irrigation Papers, 97-100, 103, 105-122, 124-136, 141, 143-146, 149.
Professional Papers, 32, 34-36, 38, 39, 41, 42.
Mineral Resources of U. S., 1903.

Department of Agriculture, Washington, D.C.
Field operations of the Bureau of Soils, 1902.
General Index Experimental Station Record Vols. 1-12.
20th Annual Report, Bureau of Animal Industry, 1903.
Year Book, 1902, 1903, 1904.

Department of Commerce and Lacor.
Statistical Abstracts, N. S., 1904.

Smithsonian Institution.
Annual Report, 1903, 1904.

Mexican Geological Department.
Parergones del Instituto Geologico de Mexico.
Tomo I, No. 6, 8.
Bulletin del Instituto Geologico de Mexico, Num. 20.

Colorado—Report of State Bureau of Mines, 1903, 1904.

Idaho—Report of State Inspector of Mines, 1904.

Illinois—23rd Annual Coal Report, 1904.

Iowa Geological Survey Report, Vol. XV.

Massachusetts—35th Annual Report of the State Board of Health.

Michigan—Report of State Board of Geological Survey, 1903. (2 copies.)

New Jersey—Final Report of State Geologist, Vol. VI. (2 copies.)
Annnal Report State Geologist, 1904. (2 copies.)

New York—State Museum Report, Vol. XLVI, Parts 1, 2, 3, 4.
High School Department Bulletin 23-26.
State Library Bulletins, 88.
Regent's Bulletins, 62, 63, 64.
22nd Report State Geologist, 1902.
State Department of Health Report, 1902.

Ohio—Preliminary Report of the Ohio Typographic Survey, 1903.

South Carolina—Geological Survey, Bulletin No. 1.

Wisconsin—Bnlletins of University of Wisconsin, No. 99, 102.

Wyoming Mines Department—Mining in the Grand Encampment Copper District.

American Institute of Mining Engineers.
Transactions, Vol. XXXIV, XXXV.

Harvard University,
Annual Report of President, 1903, 1904.

Cornell University.
Transactions of the Association of Civil Engineers, 1905.
Lake Superior Mining Institution Proceedings, Vol. X.
Engineering Society of Western Pennsylvania.
Transactions, Vol. I.
Proceedings, Vol. V-X (inclusive.)

Also the current Volumes as issued of—

The School of Mines Quarterly.
The Yale University Science Monthly.
Technology Quarterly.
Technology Review.
Forestry Quarterly.
Record of Technical and Secondary Education.
Journal of the Society of Western Engineers, Chicago.
Proceedings of the American Society of Civil Engineers
Proceedings of the Engineering Society of Western Pennsylvania.
The Electrical News, Toronto.
The Canadian Engineer, Toronto and Montreal.
Engineering, London.
Engineering Times, London.

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Industrial Canada, Toronto.
Cement and Engineering News, Chicago.
Industrial Advocate, Halifax.
Canada Lumberman.
Pulp and Paper Magazine, Toronto.
Mines and Minerals, Scranton, Pa.
Mining Reporter, Denver, Col.
B. C. Mining Record, Victoria, B. C.
Science and Art of Mining, Wigan, England.
New Zealand Mines' Record.
Canadian Manufacturer, Toronto.
The Mining World, Chicago.
Canadian Mining Review, Ottawa.
Colliery Guardian, London.
The Canadian Patent Office Record.
Inland Revenue Bulletin.
Labour Gazette.

The Illustrated Journal of Patents, London.
Diplomatic and Foreign Reports, Foreign Office, London.
Annual Series.
Treaty Series.
Miscellaneous Series.
Labour Gazette, London.
West Indian Bulletin.
Monthly Report Chamber of Mines, West Australia.
Consular Reports, Washington.
Special Consular Reports.
Bulletin Department of Labor.
North Carolina Bulletin of Agriculture.
Experimental Station Record, Washington.

GRADUATES.

In the list are included graduates in the Faculty of Practical Science (B.Sc. and M.E.) and those graduates in Arts (B.A., M.A. and D.Sc.) since 1887, who after graduation have devoted themselves to scientific pursuits.

Graduates will confer a favor by forwarding changes of address to the Secretary.

Name.	Date of Graduation.	Occupation and Address.
Bailie, A. A., B.Sc	1906	Billing's Bridge.
Baker, C. W., B.Sc	1905	Westinghouse & Elect. Mfg. Co., Pittsburg, Pa.
Baker, J. C., B.Sc	1903	Department Indian Affairs, Ottawa.
Baker, H. S., B.Sc	1902	Westinghouse Co., East Pittsburgh, P.A.
Baker, M. B., B.A., B.Sc	1902	Lecturer, Geology and Mineralogy, School of Mining, Kingston.
Baker, Wm. C., M.A	1895	Lecturer on Physics, School of Mining, Kingston.
Bateman, G. C., B.Sc	1905	Surveyor, Guanajuato Reduction and Mines Co., Guanajuato, Mexico.
Bell, James. M., M.A	1899	Director Geol. Survey of New Zealand, Wellington, N.Z.
Berney, K. C., B.Sc	1906	Athens, Ont.
Bolton, L. L., M.A., B.Sc	1906	Portland, Ont.
Brock, Reg. W., M.A	1895	Geologist, Geological Survey. Ottawa.
Brown, T., B.Sc	1904	Asst. Chemist, Traill Smelter, Traill, B.C.
Burrows, A. G., M.A., B.Sc	1902	Provincial Assayer, Belleville.
Cairns, D. D., B.Sc., 1905, M.E., 1906		Geologist, Geol. Survey, Ottawa.
Carr-Harris, A., B.Sc	1906	Kingston, Ont.
Cartwright, C. T., B.Sc	1905	Transit-man, C. P. R. Survey, Spencer's Bridge, B.C.
Cavers, T. W., B.Sc	1904	Gananea Consol. Copper Co. of S. A., Gananea, Sonora, Mexico.
Code, L. B., B.Sc.,	1906	Kingston, Ont.
Collins, E A., B.Sc	1905	Twibine, Ont.
Connell, F. M., B.Sc	1906	Spencerville, Ont.
Corkill, E. T., B.Sc., 1904, M.E.,	1905	Inspector of Mines, Toronto.
Craig, H. B. R., B.Sc	1903	City Engineer, Kingston.
Craig, J. D., B.A., B.Sc	1900	Dominion Observatory, Ottawa

Name.	Date of Graduation.	Occupation and Address.
Cumming, A. L., B.Sc.	1905	Topographical Survey, Ottawa.
Currie, P. W., B.Sc.	1901	Dept. of Interior, Ottawa.
Dennis, E. M., B.Sc.	1904	Surveyor, Topog. Survey, Ottawa.
Dobbs, G. G., B.Sc	1906	Kingston.
Donnelly, John, jr., M.E.	1898	Hydraulic and Mining Engineer, Kingston.
Dwyer, E. B.Sc.	1902	Westinghouse Co., East Pittsburgh, Pa.
Fairlie, M. F., B.Sc.	1902	Bingham Canyon, Utah.
Fairlie, T. U., B.Sc.	1905	Transit-man, Transcontinental Ry., Brockville.
Ferguson, M. U., B.Sc.	1905	G.T.P. Survey.
Finlayson, M. D., B.Sc	1903	Transcontinental Railway.
Finnie, H. V., B.Sc.	1906	Peterboro, Ont.
Fortescue, Charles L., B.Sc.	1898	Westinghouse Co., Pittsburg, Pa.
Fox, Charles B., M.A	1895	Superintendent Pittsburg Reduction Co., St. Louis.
Gage, R. J., B Sc.	1905	Riverside, Cal.
Gleeson, J. V., B.Sc	1904	Kingston.
Gordanier, W. N., B.Sc.	1903	Napanee, Ont.
Graham, S. N., B.Sc	1900	Underground Supt., The Guanajuato Reduction and Mines Co., Guanajuato, Mexico.
Grant, J. R., B.Sc	1905	Chesley.
Grover, G. A., B.Sc.	1902	Dominion Land Surveyor, Dept. of Interior, Ottawa.
Guess George A., M. A.	1894	Chem. Cons. Copper Co., Gananea, Sonora, Mexico.
Guess, H. A., M.A	1895	Manager, Silver Lake Mine, Silverton, Col.
Hazlett, J. W., B.A., B.Sc.	1903	(Deceased.)
Instant, Reginald, B.A.	1895	Manager Corundum Refineries, Palmer's Rapids, Ont.
Jackson, H. G., B.Sc	1903	Transcontinental R'y Survey.
Johnston, W. A., M.A., B.Sc.	1905	Athens.
Kirkpatrick, Guy H., B.Sc., E.M.	1898	Colonial Club, White Hall Court, London, S.W., Eng., M.E. and Explorer in British Somaliland.
Lennox, J. S., B.Sc	1906	Kingston, Ont.
Longwell, A., B.A., B.Sc.	1903	Cobalt, Ont.
Lodge, W. L., B.Sc.	1903	Demonstrator of Chemistry, McGill University, Montreal.

Name.	Date of Graduation.	Occupation and Address.
Mabee, Horace C., B.Sc	1898	Chief Chemist, Blast Furnace, Deseronto.
Malloch, G. S., B.A., B.Sc.	1906	Hamilton.
Malone, E. E., B.Sc	1904	
Merritt, Charles P., B.Sc	1899	(Deceased).
Millar, T. R., B.Sc	1906	Kingston.
Montgomery, O. M., B.Sc	1905	Westinghouse Co., Pittsburg, Pa.
Murray, J. C., B.A., B.Sc	1901	Chemist, Londonderry Iron Works, Londonderry, N.S.
McCallum, H. E., B.A., B.Sc	1903	Kingston.
McClement, Wm. T., M.A	1903	Asst. Prof. of Botany, Queen's University.
McDiarmid, S. S. R., B.Sc	1903	Dominion Observatory, Ottawa.
MacIlquham, W. L., B.Sc	1905	Topog. Survey, Ottawa.
Mackenzie, G. C., B.Sc	1903	Asst. Founder, Londonderry Iron & Mining Co., Londonderry, N.S.
McKay, R. B., B.Sc	1904	Assayer, Slocan, B C.
Mackie, F. H., B.Sc	1905	Topog. Survey, Ottawa.
McLennan, J. D., B.A., B.Sc	1902	Dominion Observatory, Ottawa.
McLennan, K. R., B.Sc	1904	Transcont Ry. Survey.
McNab, A. J., B.A., B.Sc	1902	Chem., Traill Smelter, B.C.
MacNeill, W. K., B.Sc	1903	Asst. Chem. Dom. Iron & Steel Co., Sydney, N.S.
Macphail, J. G., B.Sc	1905	Hydrographic Survey, Ottawa.
McRae, A. D., B.A., B.Sc	1902	Surveyor, Kingston & Pembroke Railway.
Neish, Arthur C., B.A	1898	Demonstrator, Columbia School of Mines, New York City.
Nicol, Wm., M.A	1889	Prof. of Mineralogy, School of Mines, Kingston.
Noble, D. S., B.Sc	1902	C. P. R. Survey.
Pense, E. H., B.Sc	1904	Ottawa.
Pinkerton, W. A., B.Sc	1906	Portland, Ont.
Pope, Fred. J., M.A	1890	Mining Engineer, Rickets & Banks, 104 John Street, New York.
Rawlins, J. W., B.A , B.Sc	1901	Chief Chemist, Canadian Copper Co., Copper Cliff, Ont.
Redmond, A. V., B.Sc	1903	Engineering Staff Grade Revision, C. P. R.
Reid, F. D., B.Sc	1904	Asst. Supt. Can. Corundum Co., Craigmont, Ont.
Reid, J. A., B.Sc	1902	Hamilton Iron & Steel Co., Hamilton, Ont.
Richardson, G. T., B.Sc	1906	Kingston, Ont.

Name.	Date of Graduation.	Occupation and Address.
Robertson, J. J., B.Sc..	1906	Fergus Falls, Minn.
Rogers, Will C., B.A.	1899	Chemist, Socorro Mine, Chihuahua, Mexico.
Rose, S. L. E., B.Sc.	1903	Centreville, Ont.
Scott, H. H., B.Sc.	1905	Electrical Engineer, Montreal, Que.
Scott, O. N., B.Sc.	1903	Foreman International Coal & Coke Co., Coleman, Alta.
Scott, Thomas S., B.A., B.Sc.	1898	Engineer, Ont. Power Co., Niagara Falls Centre, Ont.
Sears, J., B.Sc.	1905	Engineer, Construction T. & N. C. R.
Shorey, E.C.,M.A.,1887,D.Sc.,	1885	Food Commissioner and Government Chemist, Hawaii Territory.
Shorey, P. M., B.Sc.	1906	Oshawa, Ont.
Silver, L. P., B.Sc.	1902	Geologist, Exploring Party, Bureau of Mines.
Sloan, D., B.Sc	1905	Three Forks, B.C.
Smeeton, W. F., B.Sc.	1901	Asst. Chem., Copper Co., Copper Cliff, Ont.
Smyth, W. L., B.Sc.	1906	Pembroke, Ont.
Squire, R. L., B.Sc	1904	Assistant Engineer, Pembroke, Ont.
Stevens, F. G., B.Sc., M.E.	1901	Mining Supt. Guanajuato Cons. Mining & Milling Co., Guanajuato, Mexico.
Stilwell, A. J., B.Sc	1902	Consulting Chemist, DuBois Leather Industries Laboratory, DuBois, Pa.
Strachan, B. O., B.Sc	1905	Transit-man, Transcontinental Survey.
Sutherland, E., B.Sc	1902	
Thornton, L. A , B.Sc.	1906	Peterboro, Ont.
Timm, W. B., B.Sc.	1906	Westmeath, Ont.
Walker, H., B.Sc	1904	Metcalfe, Ont.
Walker, Thomas L., M.A.	1890	Prof. of Mineralogy, Toronto University, Toronto.
Way, W. C., B.Sc., 1905, M.Sc.,	1906	Demonstrator, Electrical Engineering, School of Mining, Kingston, Ont.
Webster, A. R., B.Sc.	1904	Engineer, Power Works, Can. Copper Co., Turbine.
Wells, J. Walter, B.Sc..	1898	Manager, Buffalo Mine, Cobalt, Ont.
Wilgar, W. P., B.Sc.	1903	Engineer, Transcontinental Survey.

Name.	Date of Graduation	Occupation and Address.
Wood, Isaac, M.A., M.D	1891	Assist. in Chemistry, School of Mining, Kingston.
Workman, C. W., B.Sc.	1903	Mining Engineer, Guanajuato, Mexico.
Workman, J. K., B.Sc	1904	Asst. Chem. Can. Copper Co., Copper Cliff, Ont.
Wright, A., B.Sc	1905	Brockville, Ont.

LIST OF STUDENTS.

1905-'06.

FIRST YEAR.

Name.	Address.
Agassiz, W. A. S.	Kingston.
Armstrong, A. E.	Ottawa.
Barnum, L. A.	Poughkeepsie, N.Y.
Benn, I. L.	Long Kale, Ont.
Birkett, E. H.	Kingston.
Bowen, G. H.	Ganaoque.
Bruce, E. L.	Smith's Falls.
Burgess, J. A.	Wolfville, N.S.
Callander, R.	Insch, Aberdeenshire, Scotland.
Campbell, T. D.	Perth, Ont.
Carmichael, J. E.	Strathcona, Alta.
Chartrand, E.	Chartrand, Ont.
Collins, W. H. E.	Chicago, Ill.
Davidson, R. A.	Strathroy.
Drury, C .W.	Kingston.
Ebbern, T. W.	Binscarth, Man.
Elliott, R. A.	Woodstock.
Elliott, W. J.	Bluevale.
Ferguson, D.	Disley, Assa.
Findlay, A.	Winnipeg, Man.
Frost, E. S.	Pembroke, Ont.
Gardiner, K. M.	Kingston.
George, G.	Eganville.
George, W. B.	Eganville.
Gilbert, G. C.	Kingston.
Gorman, A.	Eganville.
Hambly, W. R.	Napanee.
Hays, C.	Port Colborne.
Holbrook, C. H.	Ottawa.
Hope, A.	San Fernando, Trinidad, B.W.I.
Hubbard, W. H.	Kingston.
Jackson, G. W.	Kingston.
Jenkins, G. A.	Orwell, P.E.I.
Kelso, J.	Wallacetown.
Kilburn, G. H.	Stratford.
Laturney, F.	Kingston.
Lawson, W. E.	Helen Mine, Ont.
Lockett, W. F.	Kingston.
Lowe, G. S.	Kingston.
Lyon, C. D.	Arnprior.

Name.	Address.
McDowall, R. J.	Kingston.
McIntosh, J. S.	Iroquois.
MacKay, A. A.	Scotstown, Que.
McKenzie, R. M.	Eganville.
MacParland, A. J.	Kingston.
Neilson, A. C.	Stella.
Newlands, N.	Kingston.
Nichol, D. S.	Catarauqi.
O'Brien, W. E.	Ottawa.
Ockley, R.	Kingston.
Osborne, J. K.	Consecon, Ont.
Peeling, C. U.	Campbellford, Ont.
Perry, O. M.	Perth, Ont.
Phillips, C. S.	Minden, Ont.
Ransom, F.	Kingston.
Roberts, W. H.	Sharbot Lake.
Roney, F. W.	Kingston.
Saint, J. B.	Vancouver, B.C.
Scott, J. Norris	Kingston.
Scott, J. Niven	Wallaceburg.
Scott, A. W.	Brooklyn, N.Y.
Shaver, P. A.	
Sills, O.	Ottawa.
Simmons, G. A.	Simmons P.O., Que.
Smith, R.	Kingston.
Squire, A.	Kingston.
Stothers, H. H.	Ottawa.
Timm, W. B.	Westmeath.
Walker, H. W.	Weber, Hamilton, Bermuda.
Whitmarsh, F. J.	Wolfe Island.
Williams, M. Y.	Bloomfield, Ont.
Williams, T. B.	Bloomfield, Ont.
Woods, S. A.	Tamworth, Ont.
Young, A. C.	Renfrew.

SECOND YEAR.

Name.	Address.	Branch of Engineering.
Agnew, C. W.	Douglas, Ont.	Elect. & Mechan.
Baker, F. G.	Kingston, Ont.	Electrical.
Bennett, J.	Kingston	Electrical.
Brown, C. D.	Whitehaven, Eng.	Civil.
Campbell, W. M.	Eganville	Mining.
Cordukes, J. P.	Elginburg	Mining.
Cummings, A.	Fernie, B.C.	Civil.
Cunningham, S. L.	Kingston	Mining.
Dempster, J. H.	Gananoque	Civil.

Name.	Address.	Branch of Engineering.
Fleming, D. B.	Craigleith	Electrical.
Fleming, H.	Craigleith	Mechanical.
Fleming, J. E.	Craigleith	Mining.
Harding, W. M.	Coal Creek, B.C.	Mining.
Jeffery, J. J.	Nelson, B.C.	Mining.
Jeffery, R. T.	Elder's Mills	Elect. & Mechan.
Marshall, J. H.	Cleveland, Ohio	Electrical.
Milliken, J. B.	Strathroy	Mining.
McCandless, I.	Kingston	Electrical.
McColl, C. R.	Chatham	Civil.
McEachern, J. J.	Gravenhurst	Mining.
McGinnis, T. A.	Belleville	Civil.
McKay, R. B.	Cornwall	Mining.
Norrish, B. E.	Walkerton	Mechan. & Elect.
Orford, C.	De Lamar, Idaho	Mining.
Pound, R.	Kingston*	Electrical.
Pringle, J. F.	Cornwall	Civil.
Richmond, D. W.	Brighton, Ont.	Electrical.
Rockwell, D. B.	Duluth, Minn.	Mining.
Saunders, H. C.	Kingston	Civil.
Stanley, O. C.	Port Colborne	Civil.
Stewart, A. G.	Ottawa	Mining.
Stidwell, F.	Dutton	Civil.
Stott, J.	Sapperton, B.C.	Mining.
Sweezey, R. O.	Quebec, Que.	Civil.
Trueman, J. D.	St. John, N.B.	Mining.
Watson, A. R.	Beaverton	Civil.
Williams, J. L.	Kingston	Electrical.

THIRD YEAR.

Name.	Address.	Branch of Engineering.
Akins, J. R.	Kinburn	Mining.
Alder, W. R.		Mining.
Arthur, A. J.	Carleton Place	Electrical.
Brown, E. W.	Hawkesbury	Mining.
Brown, P. J.	Kingston	Electrical.
Calvin, J. D., B.A.	Kingston	Civil.
Campbell, A. S.	Stonewall, Man.	Civil.
Code, E. S. L.	Kingston.	Electrical.
Cooper, R. H.	Winnipeg, Man.	Civil.
Curtin, C. J.	Brockville	Mining.
Denovan, J.	Dalkeith	Electrical.
Dunkley, J. B.	Picton	Mining.
Fleming, A. A.	Craigleith	Miner. & Geology.
Fleming, A. G.	Craigleith	Mining.
Gardiner, K. V.	Ottawa	Mining.
Germain, H. A.	Kingston	Electrical.

Name.	Address.	Branch of Engineering.
Gillis, W. C.	Matapedia	Mining.
Gleeson, L. J.	Kingston	Mechanical.
Guy, R. D.	Winnipeg, Man.	Miner. & Geology.
Herriott, G. H.	Souris, Man.	Civil.
Houston, D. W.	Omaha, Neb.	Mining.
Irwin, R. T.	Norwich	Mining.
Jenkins, W. E.	Orwell, P.E.I.	Civil.
Kilburn, D. G.	Stratford	Civil.
King, J. L.	Fairfax, Man.	Civil.
King, S.	Rossland, B.C.	Miner. & Geology.
Lavell, F. M.	Smith's Falls	Mechanical.
Lavoie, E.	Baie-St. Paul, Que.	Civil.
Lazier, F. S.	Belleville	Civil.
Malcolm, L., M.A.	Stratford	Civil.
Matheson, H.	Armow	Mining.
Murphy, A. A.	Portland	Electrical.
Murray, C. W.	Mission City, B.C.	Mining.
McArthur, F.	Gore Bay	Civil.
McEwen, D. F.	Hensall	Mining.
McKay, G. J.	Owen Sound	Mining.
McKenzie, M.	Scotstown, Que.	Civil.
Orr, F. O.	Peterboro	Mining.
Ostrom, S. A.	Alexandria	Civil.
Peppard, H.	Springhill, N.S.	Civil.
Potter, R.	New York, U.S.A.	Civil.
Rogers, W. R.	Thordale	Civil.
Sands, J. M.	Kingston	Mining.
Toffey, F. H.	Portland	Mechanical.
Twitchell, K. S.	St. Albans, Vt.	Mining.
Woolsey, W. J.	Black Lake, P.Q.	Mining.
Wright, G. C.	Kingston	Civil.

FOURTH YEAR.

Name.	Address.	Branch of Engineering.
Bailie, A. A.	Billing's Bridge	Mechanical.
Berney, K. C.	Athens	Electrical.
Bolton, L.L., M.A.	Portland	Miner. & Geology.
Carr-Harris, A.	Kingston	Mining.
Code, L. B.	Kingston	Electrical.
Connell, F. M.	Spencerville	Mining.
Dobbs, G. G.	Kingston	Mining.
Dobbs, W. S.	Kingston	Miner. & Geology.
Finnie, H. V.	Ottawa	Electrical.
Grenon, J. F.	Chicoutimi, P.Q.	Civil.
Keith, G. C.	Smith's Falls	Mechanical.
Lennox, J. S.	Kingston	Electrical.
Malloch, G.H., B.A.	Hamilton	Miner. & Geology.

Name.	Address.	Branch of Engineering.
Millar, T. R.	Kingston	Electrical.
McCulloch, R.	Souris, Man.	Civil.
McEwen, R. L.	Carleton Place	Mechanical.
McGinnis, W. C.	Belleville	Mining.
Pinkerton, W. A.	Portland	Electrical.
Richardson, G. T.	Kingston	Mining.
Robertson, J. J.	Fergus Falls	Mining.
Shaver, P. A.	Kingston	Civil.
Shorey, P. M.	Oshawa	Mining.
Smyth, W. L.	Pembroke	Electrical.
Speirs, T.	Appelton	Electrical.
Stiles, L. P.	Cornwall	Electrical.
Thornton, L. A.	Peterboro	Civil.

SPECIAL STUDENTS.

Chapelle, J. W. S.	Kingston.
Dupuis, E. L	Kingston.

POST GRADUATE STUDENTS.

Way, W. C., B.Sc.	Lindsay.

GRADUATES, 1906.

MASTER OF SCIENCE (M.Sc.)

Way, W. C.	Lindsay ,Ont.

BACHELOR OF SCIENCE (B.Sc.)

Name.	Address.	Branch of Engineering.
Bailie, A. A.	Billing's Bridge	Mechanical
Berney, K. C.	Athens	Electrical.
Bolton, L. L., M.A.	Portland	Miner. & Geology.
Carr-Harris, A.	Kingston	Mining.
Code, L. B.	Kingston	Electrical.
Connell, F. M.	Spencerville	Mining.
Dobbs, G. G.	Kingston	Mining.
Finnie, H. V.	Peterboro	Electrical.
Lennox, J. S.	Kingston	Electrical.
Malloch, G. S.	Hamilton	Mining.
Millar, T. R.	Kingston	Electrical.
Pinkerton, W. A.	Portland	Electrical.
Richardson, G. T.	Kingston	Mining.
Robertson, J. J.	Fergus Falls, Minn.	Mining.
Shorey, P. M.	Oshawa	Mining.
Smyth, W. L.	Pembroke	Electrical.
Thornton, L. A.	Peterboro	Civil.
Timm, W. B.	Westmeath	Mining.

MINING ENGINEER (M.E.)

Cairnes, D. D., B.Sc.....Ottawa.

PRACTICAL SCIENCE SCHOLARSHIPS.

Chancellor's, $70 .....Carmichael, J. D.....Strathcona, Alta.

STUDENTS WHO HAVE PASSED FIRST YEAR (SCIENCE), IN ORDER OF MERIT.

Carmichael, J. E.
Williams, M. Y.
Kilburn, G. H.
Kelso, J. A.
Gilbert, C. G.
Ferguson, D.
Bruce, E. L.
Perry, O. M.
Osborne, J. K.
Lawson, W. E.
Peeling, C. U.
Frost, E. S.
Nichol, D. S.
Elliott, W. J.
Jenkins, G. A.
*Williams, T. B.
Chartrand, E.
Simmons, G. A.
Woods, S. A.
Campbell, T. D.
Young, A. C.
Ebbern, T. W.
Scott, James N.
Hays, C. L.
*Wilkins, J. C.
McDowall, R. J.
*Drury, C. W.
*Ockley, R.
Ryan, F. H.
Agassiz, W.
*Jackson, G. W.
Hambly, W. R.
*McIntosh, J. S.
*Sills, O.
*Saint, J. B.
*Mackay, A. A.
Squire ,A. M.
*Newlands, N.
*Ransom, F.
*Neilson, A. C.
*Lowe, G. S.

PASS LISTS.

SUPPLEMENTAL EXAMINATIONS, SEPTEMBER, 1905.

Physics I, B.—Sweezey, R. O.; Fleming, A. A.; McCandless, I.
Mathematics I, Geometry.—McGinnis, T. A.; Agnew, C. W.
Mathematics I, Trigonometry.—Toffey, F. H.; Agnew, C. W.
Mathematics I, Algebra.—Cunningham, S. L.; McGinnis, T. A.; Toffey, F. H.
Descriptive Astronomy.—Fleming, A. G.; Toffey, F. H.
Mathematics II, Spher. Trig. and Astronomy.—Gillis, W. C.; Campbell, A. S.
Mathematics II, Conics and Calculus.—Sands, J. M.; Potter, R.; McEwen, R. L.; Trueman, J. D.; Connell, F. M.
Junior Chemistry.—Campbell, W. M.
Senior Chemistry.—Alder, W. R.; Bailie, A. A.; Flmeing, A. A.; Campbell, A. S.; Speirs, T.
Optical Mineralogy.—Sands, J. M.; Connell, F. M.; Gardner, K. V.
Pass Geology.—Clarke, T. E.; Cooper, A. B.; Barker, J.; McNabb, J.
Metallurgy I.—McEwen, D. F.; Weld, W. E.; McGinnis, W. C.
Electrical Engineering I.—Dobbs, G. G.; Connell, F. M.; Richardson, G. T.
Thermodynamics I.—Robertson, J. J.; Browne, P. J.; Dobbs, G. G.; Richardson, G. T.; Drummond, L. E.
Mechanical Engineering II.—Denovan, J.
General Engineering I.—Ostrom, S. A.; Speirs, T.; McArthur, F. T.; Alder, W. R.
General Engineering II.—Weld,W. E.; Bailie, A. A.; Denovan, J.
Surveying III.—Dobbs, G. G.; McGinnis, W. C.; Weld, W. E.
Surveying II.—Kilburn, D. G.; Campbell, A. S.; Fleming, A. G.; Alder, W. R.; Twitchell, K. S.
Surveying I.—Fleming, H.; Fleming, A. A.; Pound, R.; Fleming, J. E.; Cunningham, S. L.
Descriptive Geometry.—Bailie, A. A.; Gardner, K. V.; Browne, P. J.; Orwald, W. A.; McArthur, F. T.

SESSIONAL EXAMINATIONS, APRIL, 1905.

Junior English.—Div. I, Williams, T. B.; Williams, M. Y. Div. II—Carmichael, J. E.; Lawson, W. T.; Kelso, J.; Ebbern, T. W.; Perry, O. M.; Gilbert, C. G.; Osborne, J. K.; Bruce, E. L.; Simmons, G. A.; MacParland, A.; Macdowall, R. J.; Barnum, L. A. Div. III—Kilburn, G. H.; Young, A. C.; McIntosh, J. E.; Elliott, W. J.; Frost, E. A.; Hambly, W. R.; Peeling, C. W.; Sills, O.; Alder, W. R.; Nicol, D. S.; Potter, S. C.; Woods, S. A.; Gorman, A.; Agassiz, W.; Ockley, R.; Campbell, T. D.; McKay, A.; Ryan, F. H.; New-

lands, N.; Lyon, C. B.; Hayes, C. L.; Pennock, A. C.; George, G.; Scott, J. N.; O'Brien, W.; McEwen, R. L.; Squire, A. M.; Marshall, J. H.

Mathematics I, Algebra.—Div. I, Kelso, J.; Kilburn, G. H.; Crawford, V. W.; Bruce, E. L.; Carmichael, J. E.; Bothwell, N. D.; Ferguson, D.; Peeling, C. U.; Gilbert, C. G.; Williams, M. Y.; Elliott, W. J.; Drury, C. W.; Osborne, J. K.; Perry, O. M. Div. II—Wilkins, J. C.; Frost, E. S.; Williams, K. F.; Swinburn, A. H.; Young, A. C.; Campbell, T. D.; Lawson, W. E.; Simmons, G. A.; Nichol, D. S.; Williams, T. B.; Chartrand, E.; McDowall, R. J. Div. III—Sills, O.; Woods, S. A.; Hays, C. L.; Neilson, A. C.; Armstrong, A. E.; George, W. B. ;Lavell, F. M.; McIntosh, J. S.; Saint, J. B.; Ebbern, F. W.; Jenkins, G. A.; Newlands, N.; Ryan, F. H.; Scott, J. N.; McCandless, I.; Ockley, R.; Lowe, G. S.; Hambly, W. R.; MacKay, A.; Squire, A. M.; Jackson, G. W.; Fleming, J. E.; Lockett, W.; Stirling, J. B.; Collins, W.; Gardiner, K. M.; George, G.

Mathematics I, Geometry.—Div. I, Gilbert, C. G.; Williams, M. Y.; Perry, O. M.; Kelso, J. A.; Bruce, E. L.; Kilburn, G. H.; Carmichael, J. E. Div. II—Crawford, V. W.; Frost, E. S.; Scott, J. N.; Williams, K. F. Div. III—Peeling, C. U.; Ferguson, D.; Young, A. C.; Osborne, J. K.; Swinburn, A. H.; Elliott, W. J.; Drury, C. W.; Ryan, F. H.; Agassiz, W.; McIntosh, J. S.; Nichol, D. S.; Bothwell, N. D.; Chartrand, E.; Woods, S. A.; Ebbern, F. W.; Simmons, G.; Jenkins, G. A.; Squire, A. M.; Hays, C. L.; McDowall, R. J.; Barnum, L. A.; George, W. B.; Lawson, W. E.; Lockett, W.; Newlands, N.; Campbell, T. D.; Hambly, W. R.; Neilson, A. C.; Stirling, J. B.

Mathematics I, Trigonometry.—Div. I, Carmichael, J. E.; Kelso, J. A.; Bruce, E. L.; Gilbert, C. G.; Ferguson, D.; Kilburn, G. H.; Williams, M. Y.; Crawford, V. W.; Nichol, D. S.; Williams, K. F.; Wilkins, J. C.; Frost, E. S.; Elliott, W. J.; Drury, C. W. Div. II—Bothwell, N. D.; Lawson, W. E.; Perry, O. M.; Chartrand, E.; Ryan, F. H.; Simmons, G. A.; Peeling, C. U.; Young, A. C.; Jenkins, G. A. ;Osborne, J. K.; Hays, C. L.; Woods, S. A.; Campbell, T. D.; Scott, J. N. Div. III—George, G.; Scott, A. W.; Ockley, R.; Agassiz, W.; Jackson, G. W.; Stirling, J. B.; McKenzie, R. M.; Lowe, G. S.; Swinburn, A. H.; Newlands, N.; Lockett, W.; MacKay, A.; Barnum, L. A.; Fleming, J. E.; McIntosh, J. S.; Hambly, W. R.; Callander, R.; Gorman, A.; Neilson, A. C.; George, W. B.; Ransom, T.; Sills, O.; Squire, A. M.; Ebbern, F. W.; Gardiner, K. M.; McDowall, R. J.; Pennock, E. L.; Saint, J. B.; Williams, T. B.; Birkett, E. H.; Armstrong, A. E.

Astronomy 1.—Div. I, Bruce, E. L.; Kelso, J. A. Div. II.—Gilbert, C. G.; Williams, M. Y.; Carmichael, J. E.; Ferguson, D.; Lawson, W. E.; Perry, O. M.; Jenkins, G. A.; Swinburn, A. H.; Bolton, L. L.; Frost, E. S.; McDowall, R. J.; Bothwell, N. D.; Watson, A. R.; Kilburn, G. H.; Chartrand, E.; Wilkins, J. C.; Fleming, D. B.; Osborne, J. K.; Williams, T. B. Div. III—Fleming, A. A.; MacKay, A.; Elliott, W. J.; Ockley, R.; Crawford, V. W.; Peeling, C. U.; Ebbern, F. W.; Agassiz, W.; George, W. B.; Newlands, N.; Ransom, F.; Young, A. C.; Simmons, A. C.; McIntosh, J. S.; Woods, S. A.; MacParland, A.; Barnum, L. A.; Ryan, F. H.; Dempster, H.; Saint, J. B.; Hays, C. L.; Nicol, D. S.; Birkett, E. H.; Bowen, G. H.; Callander, R.; Holbrook, C. H.; McGinnis, T. A.; Stirling, J. B.; Scott, J. N.; Collins, W.; Campbell, T. D.; Squire, A. M.; Górman, A.; Pennock, E. L.; Williams, K. F.; McKenzie, K. M.

Mathematics II.—Div. I, McColl, C. R.; Findlay, A.; Stidwell, F.; Cummings, A. Div. II—Pringle, J. F.; Daley, J. C.; Rockwell, D. B.; McKay, B. F.; Jeffery, R. T. Div. III—Jeffery, J. J.; Norrish, B. E.; Orford, C.; Campbell, A. S.; Brown, C. D.; Dempster, H.; Fleming, D. B.; Stott, J.; Irwin, R. T.; Richmond, D. W., Kilburn, D. G.; Ostrom, S. A.; Murphy, A. A.; Sweezey, R. O.; Baker, F. G.; McArthur, F. F.; McEachran, J. J.; Harding,W. M.; Milliken, J. B.; Marshall, J.; Fleming, H.; Cordukes, J. P.; McCandless, I.; Code, E. S. L.; Stewart, A. G.; Saunders, H. C.; Gleeson, L.

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Cordukes, J. P.; MacKay, A. A.; Sills, O.; McDowall, R. J.; Lowe, G. S., McIntosh, J. S., Williams, K. F., equal; Fleming, J. E.; Squire, A. M., Dunkley, J. B., equal.

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Quantitative Analysis II—Div. II, Akins, J. R. Div. III—Matheson, H.

Quantitative Analysis I, II, III.—Div. I, Bolton, L. L.

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Geology of Canada.—Div. I, McKay, G. J.; Matheson, H.; Thornton, L. A.; Houston, D. W.; Robertson, J. J.; Orr, F. O.; King, S. Div. II—Alder, W. R.; McLaren, G. R., Sands, J. M., equal; Akin, J. R.; Irwin, R. T.; Murray, C. W.; Twitchel, K. S.; Fleming, A. G.; Fleming, A. A. Div. III—Gardner, K. V.; McGinnis, W. C.; Curtin, C. J.; Woolsey, W. J.

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Railway Engineering III.—Div. II, Rogers, W. R.; Thornton, L. A.

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Electrical Engineering II.—Div. III, Code, E. S. L.; Murphy, A. A.; Oswold, W. A.

Electrical Engineering III.—Div. I, Murphy, A. A. Div. II—Oswold, W. A.

Electrical Engineering IV.—Div. I, Lennox, J. S. Div. II—Berney, K. C.; Code, L. B.; Smyth, W. L. Div. III—Finnie, H. V.; Millar, T. R.; Pinkerton, W. A.

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Electrical Engineering VI.—Div. I, Berney, K. C. Div. II—Lennox, J. S.; Finnie, H. V.; Millar, T. R. Div. III—Smyth, W. L.; Code, L. B.; Spiers, T.; Pinkerton, W. A.

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Structural Engineering III.—Div. I, Thornton, L. A.; Grenon, J.F.

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Mechanical Engineering III.—Div. II, Lavell, F. M.; Gleeson, L. J.

Mechanical Engineering V.—Div. III, Keith, G. C.; Baillie, A. A.

Mechanical Engineering VI.—Div. III, Baillie, A. A.

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